Nokia Customer Care
2118 (RH-77)
Mobile Terminal

RF Description and Troubleshooting

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Components

Figure 1 and Figure 2 illustrate the main components of the 2118.

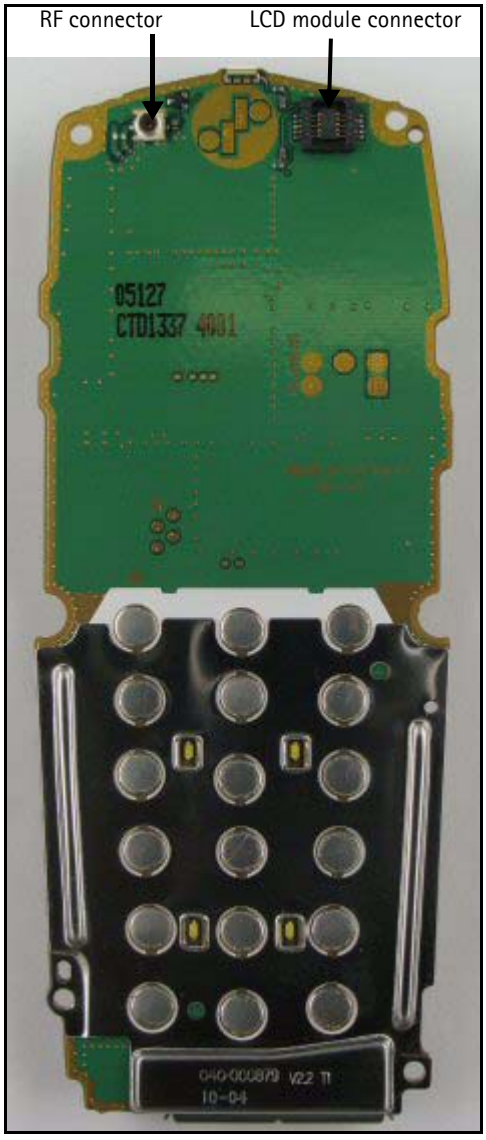

Figure 1: RF components (top)

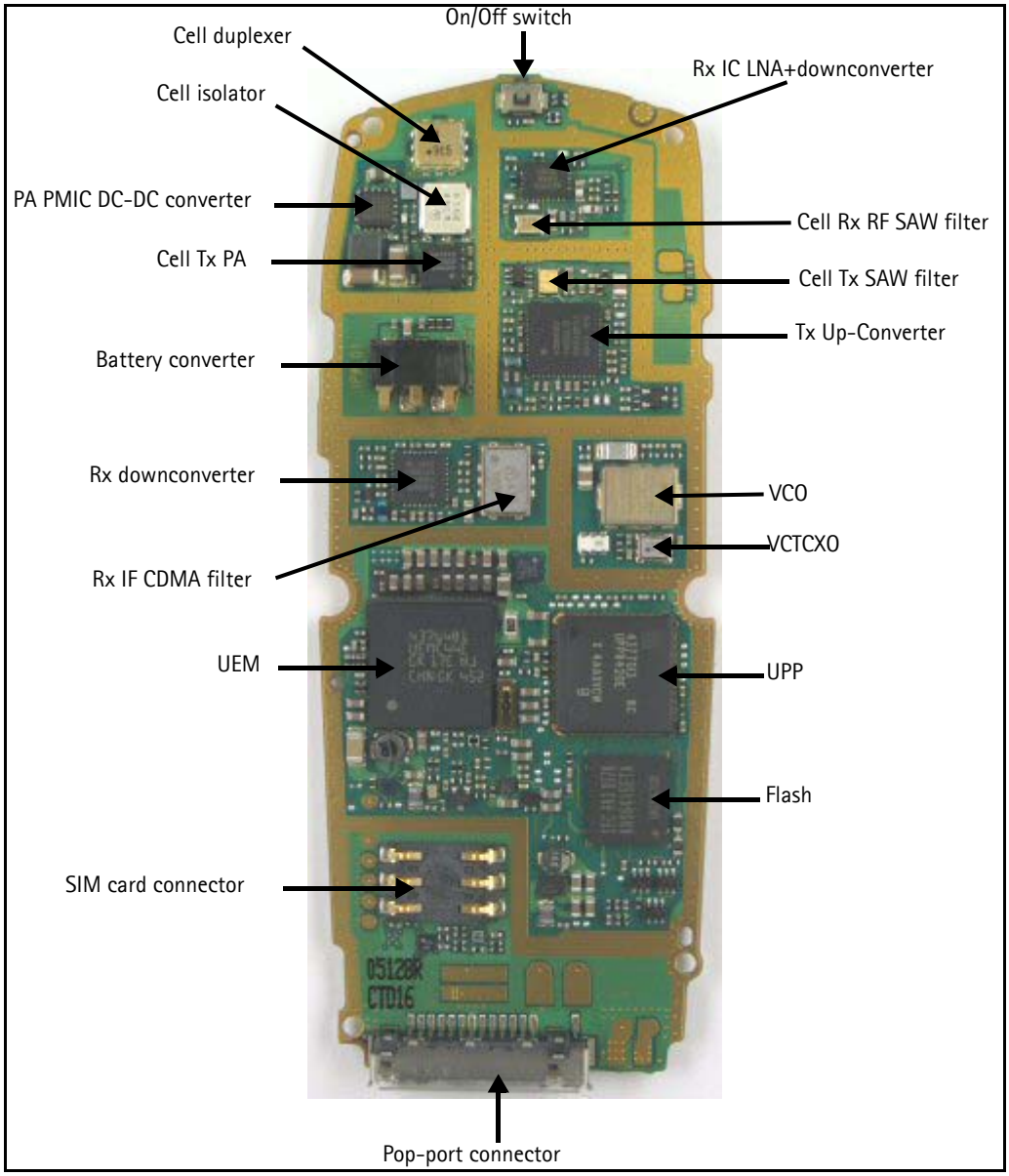

Figure 2: RF components (bottom)

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Transmitter Troubleshooting

Low Tx Power

Use Phoenix to turn on the transmitter in Local Mode, and check the following:

- Verify the current (0.7 - 1A for max power, mode, and channel dependent).
- Use a microscope to visually inspect the PWB for proper placement, rotation, and soldering of components.
- Look for the presence of a Tx signal on the spectrum analyzer at the correct frequency:
  - If the signal is not on frequency, check in the 100 MHz span.
  - If the signal is present but off frequency, check the synthesizer. Most likely, one of the synthesizers is not locked, or the VCO has no output signal.
  - If the signal is not present, or is present but low in amplitude, use the probing tables to determine where in the chain the fault occurs.
- Verify that the AGC PDMs are set for the desired Tx power as listed in the Tx AGC Tuning table on page 11, and ensure that the AGC voltages are correct.
- Check the synthesizers for proper frequency and amplitude.
- Ensure that the power supplies to the transmitter have the correct voltage.

Cell Transmitter Setup

Use the following steps to set up the mobile terminal for Tx troubleshooting in Phoenix.

1. Open the **Phone Control** dialog box.

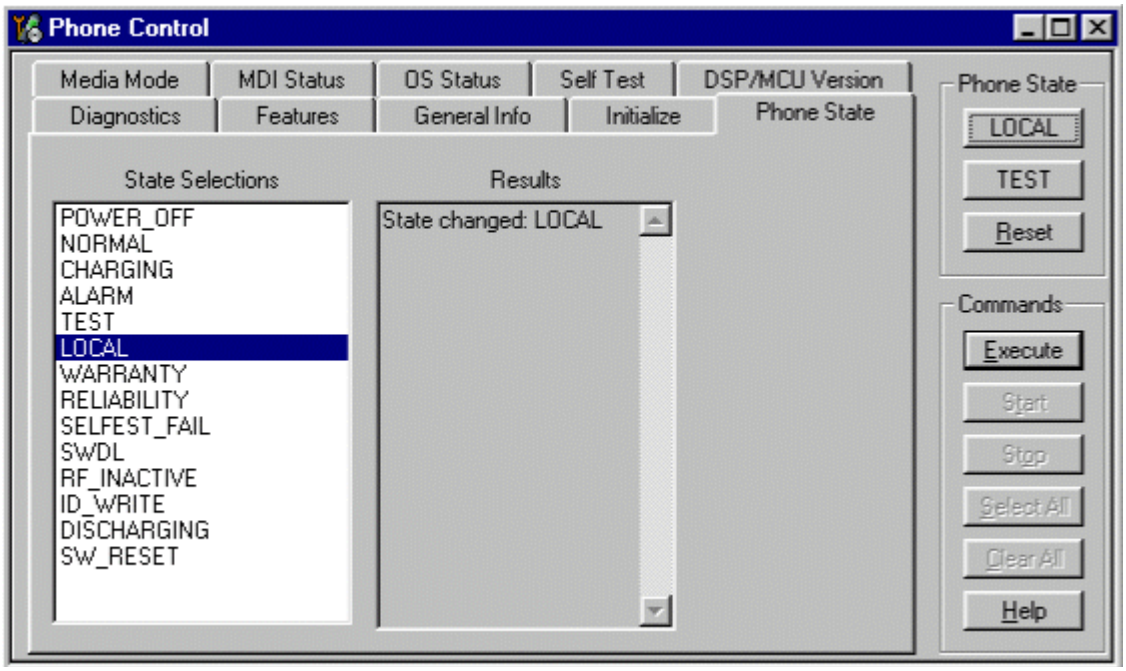

Figure 3: Phone Control dialog box for Tx troubleshooting

2. Click the **LOCAL** button in the **Phone State** area to put the mobile terminal into Local Mode.
3. Select the following values on the **RF Main Mode** dialog box:
   - **Band** = Cell (CDMA)
   - **Channel** = 384
   - **Mode** = Rx/Tx

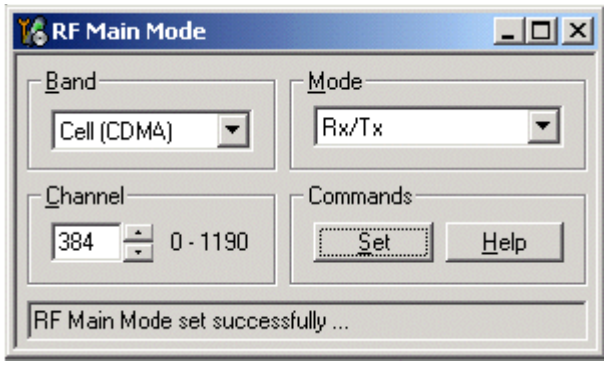

Figure 4: RF Main Mode dialog box for Tx troubleshooting

4. Click **Set**.

Note: Be sure that the "RF Main Mode set successfully" message appears in the status bar.

5. Select the **Rho ON** check box on the **CDMA Control** dialog box.

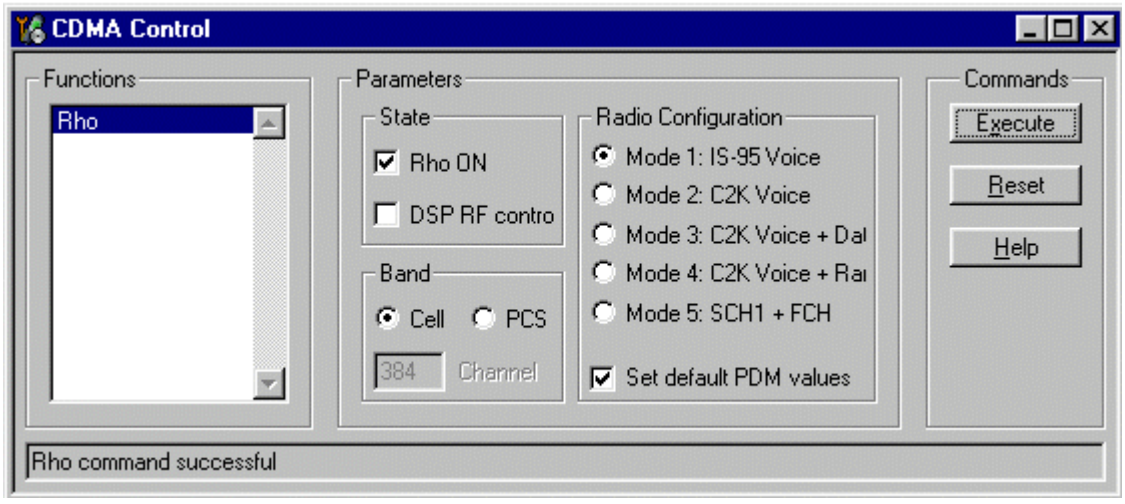

Figure 5: CDMA Control dialog box for Tx troubleshooting

6. Click **Execute**.
7. At this point you should be able to measure Tx Pout at the RF connector. The cell band Tx Pout =0 to 2 dBm. If you do not see these values, set the AGC PDM for 25 dBm and probe the Tx path to figure out where in the path the fault occurs.
8. Open the **General I/O** dialog box to set the PA gain state.

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9. Enter 10, 13, 12, and 8 in the **PIN #** fields.

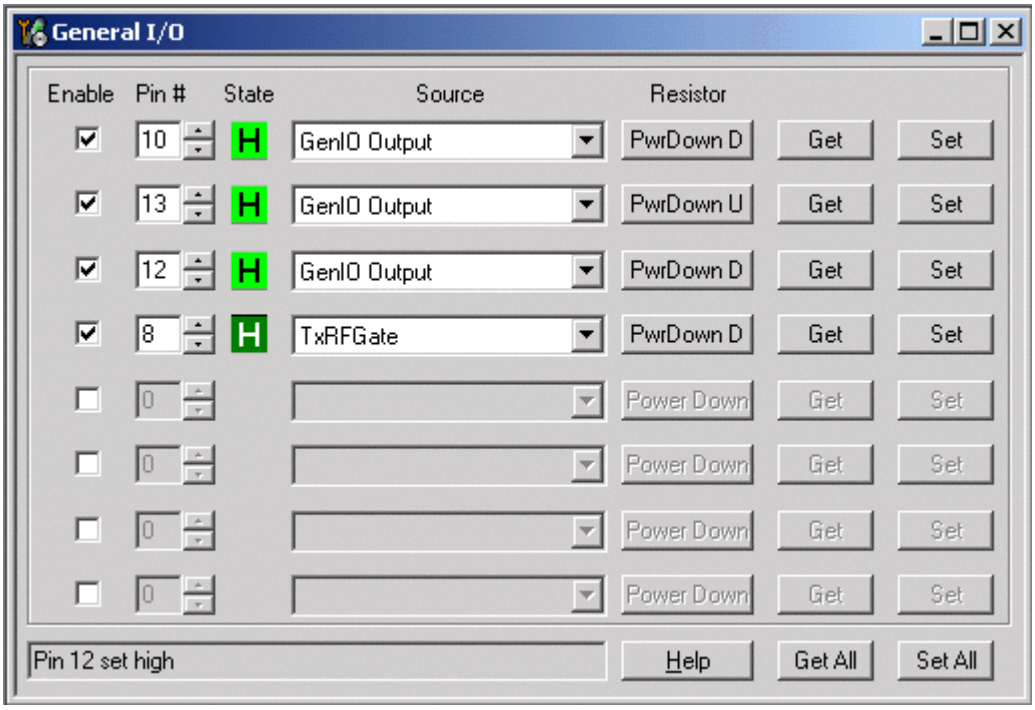

Figure 6: General I/O dialog box for Tx troubleshooting

10. Select the boxes in the **Enable** column for each pin.
11. Click the **Get All** button.
12. Ensure that all of the pins have a value of H in the **State** column. (Click the L values to change them to H values.)
13. Adjust the following PDM field values on the **RF PDM** dialog box:
    - **Tx IF AGC** = -280
    - **Tx RF AGC** = -280

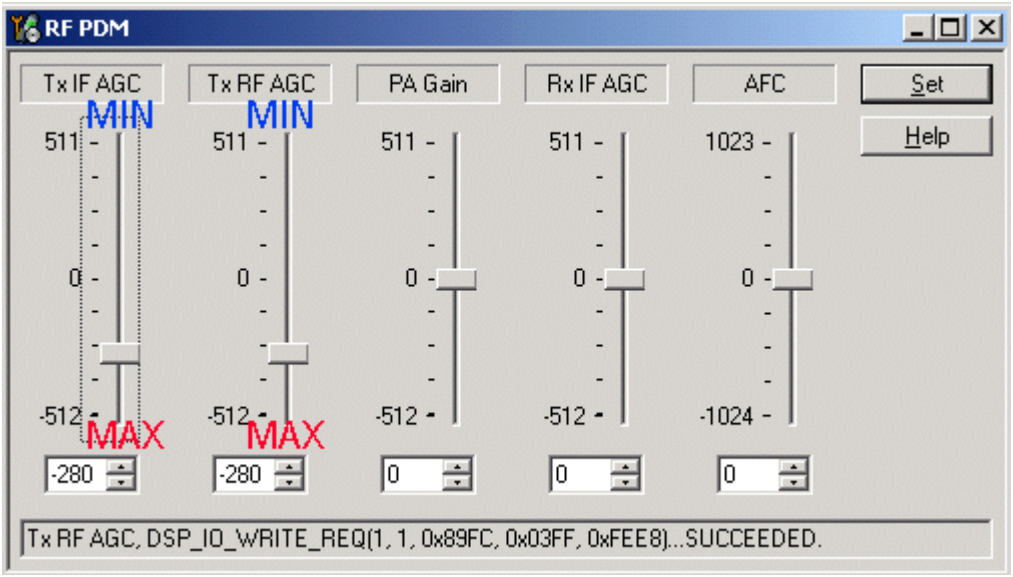

Figure 7: RF PDM dialog box for Tx troubleshooting

14. Ensure that the Phone Tx Pout = +25 dBm and the current = 770-860 mA.

Cell Transmitter Path

Table 1 indicates the test points (see Figure 8) to probe when troubleshooting the cell transmitter path. It is recommended that you follow the steps in order. An HP high frequency probe was used to make the frequency and output power measurements

Table 1: Cell Transmitter Test Points

Test Point	Part*	Function	Typical Value/ Frequency HP85024A	Typical Value Frequency Prod Probe	Comments
T1	Z601 pin1	N601-Out	-43 dBm/ 836.52 MHz	-13.2 dBm/ 836.52 MHz	Output of N601 Driver, Input to Tx SAW Filter
T2	Z601 pin 3	PA-In	-25 dBm/ 836.52 MHz	-15.4 dBm/ 836.52 MHz	Output of Tx SAW, Input to PA
T3	N803 pin 8	PA-Out	5.0 dBm/ 836.52 MHz	18.3 dBm/ 836.52 MHz	Output of PA, Input to Isolator
T4	Z803T	Iso-Out	2.2 dBm/ 836.52 MHz	10.3 dBm/ 836.52 MHz	Output of Isolator, Input to Duplexer
T5	C603L	IF-Out	-29 dBm/ 228.6 MHz	-24 dBm/ 228.6 MHz	Tx IF Probing Point at IF Filter
T6	C638T, C654T, C633R, C635R, C603LR	VR5	2.7 V dc		VHF VCO/PLL, IQ modulator supply from UEM
T7	C655R	VR7	2.7 V dc		UHF PLL Supply from UEM

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Table 1: Cell Transmitter Test Points (Continued)

Test Point	Part*	Function	Typical Value/ Frequency HP85024A	Typical Value Frequency Prod Probe	Comments
T8	C636L, C624T, L609B, C612L, C630B, L607B	VR2	2.7 V dc		Mixer, driver, and IF supply from UEM
T9	C605R, C606R	VAGC-Tx	0.2 to 1.8 V dc		Tx AGC Control Voltage from UPP. 0.2 V = Max Gain 1.8 V = Min Gain
T10	C658R, C600T	VIO-Tx	1.8 V dc		Supply for Digital circuits from UEM
T11	C805B, C810T, C816R	VBAT	3.6 V dc		Battery Voltage (Nominal Voltage 3.6 V dc)
T12	C802L, C813L	VPA	3.6 V dc (High Gain)		Main PA Supply Voltage from PMIC. Lgain=0.8 V, Mgain=-1.25 V, Hgain=Vbat
T13	C814R	VG	1.8 V dc (Enable)		PA Gate Voltage (Enable/Disable) Disable=0 V

** The R, L, T, and B values at the end of the part names indicate the Right, Left, Top, and Bottom side of the part respectively in Figure 8 and Figure 9.*

Figure 8 shows each test point for the N601 TXIC section from Table 1, "Cell Transmitter Test Points," on page 8. *Always* attach a 20 dB pad (11881-60001) when probing with an HP85024A high-frequency probe.

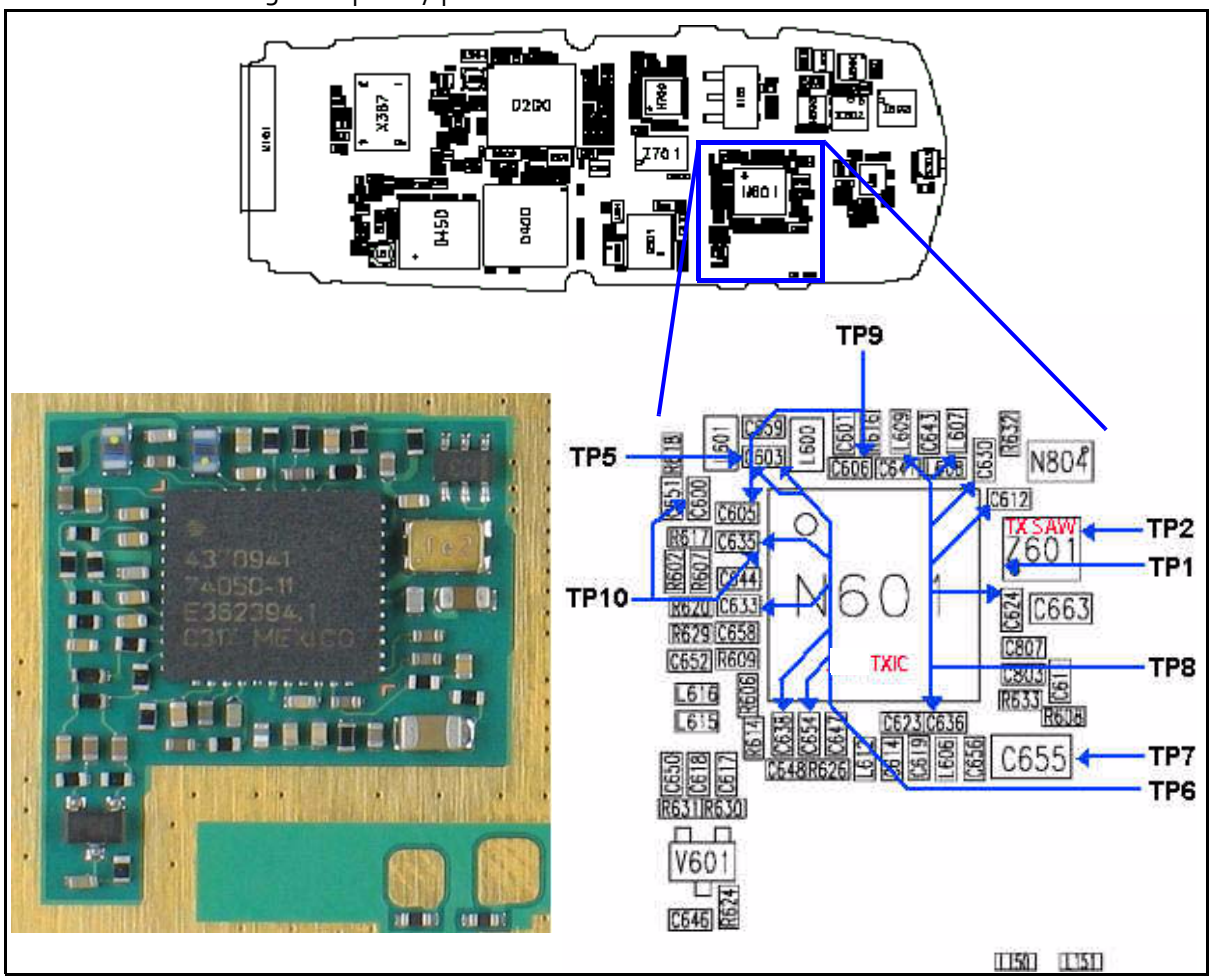

Figure 8: (Top) PWB. (Bottom left) A zoomed view of the testing points on the N601 TXIC section. (Bottom right) A zoomed view of the N601 TXIC section with part numbers.

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Figure 9 shows each testing point for the PA section from Table 1, "Cell Transmitter Test Points," on page 8. *Always* attach a 20 dB pad (11881-60001) when probing with an HP85024A high frequency probe.

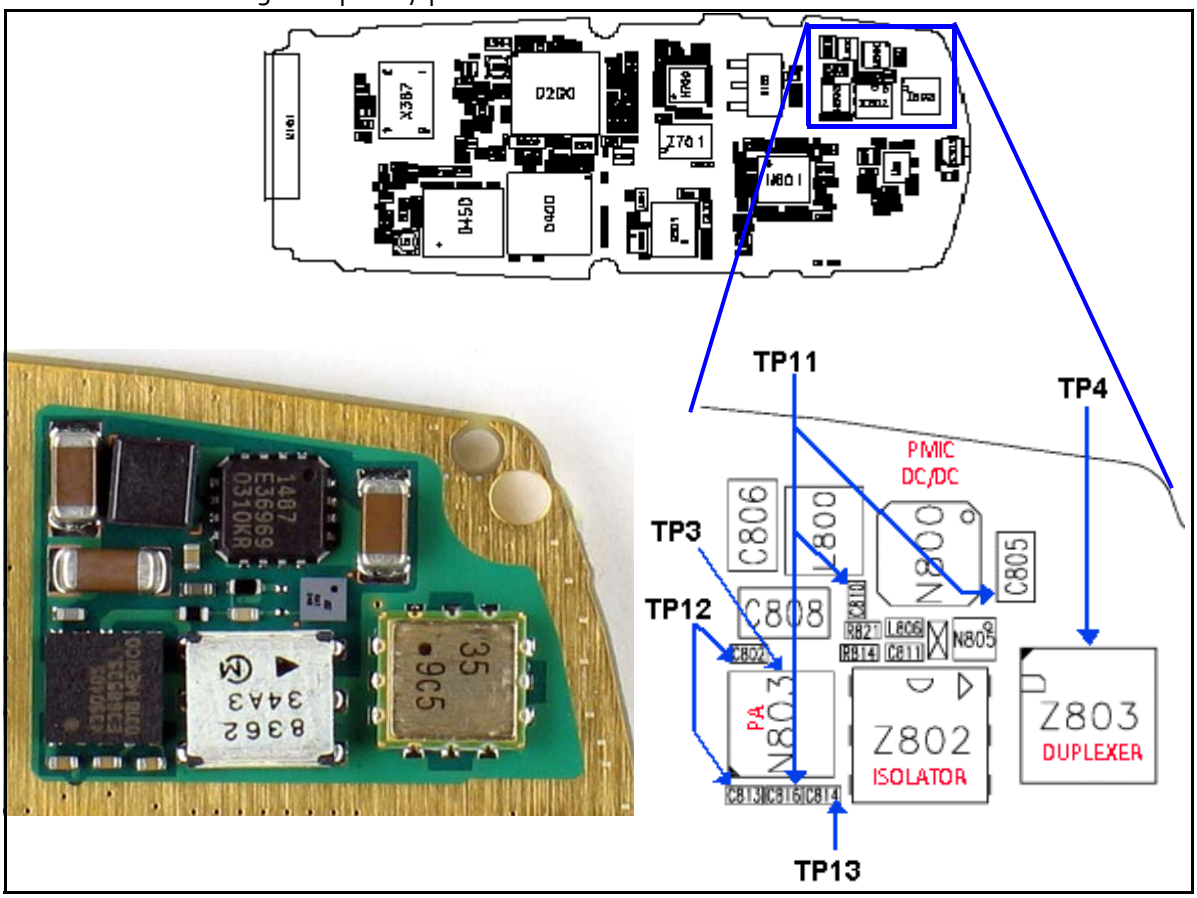

Figure 9: (Top) PWB. (Bottom left) A zoomed view of the testing points on the PA section. (Bottom right) A zoomed view of the PA section with part numbers.

Tx AGC Tuning

Tx power versus IF/RF PDM can be verified against FlaLi specification limits. Make sure that the PA is set in high gain mode (GenIO bits 10, 13, and 12 are set to H).

Table 2: Tx AGC Tuning Steps

Tx Tuning AGC Step	Tx AGC PDM Value	Target Power	Low Limit	High Limit
Tx AGC (0)	308	-46	-55	-37
Tx AGC (1)	130	-24	-34	-14
Tx AGC (2)	85	-15	-25	-6
Tx AGC (3)	51	-4.5	-14	5
Tx AGC (4)	19	2.5	-7	12
Tx AGC (5)	-5	6	-3	15

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Table 2: Tx AGC Tuning Steps (Continued)

Tx Tuning AGC Step	Tx AGC PDM Value	Target Power	Low Limit	High Limit
Tx AGC (6)	-94	15	6	24
Tx AGC (7)*	-280*	25	21	27

*Not an actual FlaLi tuning PDM. The PDM produces approximately 25 dBm at the antenna connector.

Cell Power Amplifier

The power amplifier (PA) has the DC/DC converter (PMIC device), which controls the transmitter. The following tables show the circuits that have an effect on the transmitter path and how to troubleshoot them.

Table 3: PA Power and Gain Measurements

Power Amp Input Test Point	Power Amp Output Test Point
pin3-Z601	left-R814

Table 4: PA Power and Gain Specifications

Mode	Name	Power Output Range	Nominal Gain	Vcc Range	Vcc Test Point
Gain mode 0	V0	up to 6	23.8	0.75- 0.88	C806
Gain mode 1	V1	6 to 11	25.2	1.125- 1.375	C806
Gain mode 3	V2	Not used	Not used	2 - 2.5	C806
Gain mode 2	Bypass	11 up	29	3 - 4	C806
Gain mode 0	V0	up to 6	23.8	0.75- 0.88	C806
Gain mode 1	V1	6 to 11	25.2	1.125- 1.375	C806

**Not an actual FlaLi tuning PDM. PDM to produce approximately 25 dBm at antenna connector.*

Cell PMIC

The following tables show the PMIC troubleshooting information.

Table 5: PMIC Setup

Mode	Tx	Rx	Band
Local	On	On	CELL

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Table 6: PMIC Measurements

Pin	Label	Test Point	Units	Depends On	Comments
1	EP	Pin 1	1.8	UPP	IC enable = GenIO 10
2	M0	Pin 2	1.8	UPP	Control 0 = GenIO 12
3	M1	Pin 3	1.8	UPP	Control 1 = GenIO 13
4	NC	NC	NC	NC	NC
5	FB	Pin 5	0.75 - 4	M0, M1	See PA worksheet. Output to flyback inductor.
6	FB	Pin 6	0.75 - 4	M0, M1	Shares PWB pad with pin 5
7	BYPVout	bottom-C808	0.75 - 4	M0, M1	PMIC bypass output used at Pout > 12 dBm
8	VDD	right-L810	VBATT	VBATT	Digital DC supply, shared with pin 12, 14, and 15
9	VSS	GND	GND	GND	Digital GND, shared gnd with pin 13
10	NC	NC	NC	NC	NC
11	Vbgap	NC	NC	NC	Bandgap voltage output
12	VDD	right-L810	VBATT	VBATT	Digital DC supply
13	Vss	GND	GND	GND	Digital GND, shared gnd with pin 9
14	Vsw	right-L810	VBATT	VBATT	Switcher supply
15	Vsw	right-L810	VBATT	VBATT	Switcher supply
16	Gsw	GND	GND	GND	Switcher GND, does not share with pin 9 and pin 13

Table 7: Good Mobile Terminal PMIC Resistances

Pin	Resistance
1	60 k
2	75 k
3	80 k
4	1.59 M
5	1.6 M
6	2 M
7	2 M
8	2 M
9	0.1
10	100

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Table 7: Good Mobile Terminal PMIC Resistances (Continued)

Pin	Resistance
11	115 k
12	60 k
13	0.2
14	1.3 M
15	1.18 M
16	0.1

Cell IF/RF AGC and PA Control

Table 8, "Cell CDMA Channel 384 (Skyworks PA)," on page 15 illustrates the PDM values and their typical values for the IF AGC, RF AGC N601 Pout, gain steps, and the PA VCC levels. This table also shows the typical power output at the RF connector.

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Table 8: Cell CDMA Channel 384 (Skyworks PA)

Tx RF AGC			Tx IF AGC			N601 Po		PA Gain Step		PA Vcc			Conn RF Pout
PDM	Typical Value	Test Point	PDM	Typical Value	Test Point	Typical Value	Test Point	Gen IO 12	Gen IO 13	Typical Value	Test Point	PA Gain	
-290	0.45	Bottom C606	-290	0.45	Top C605	3	pin 1 Z601	H	H	3.47	C806	DM	25
-196	0.59		-196	0.59		-2		H	H	3.61		28	20
-95	0.75		-95	0.75		-9.2		H	H	3.67		28	13.2
-95	0.75		-95	0.75		-9.2		H	L	1.2		26	11
-48	0.83		-48	0.83		-13		H	L	1.2		25.8	7
-48	0.83		-48	0.83		-13		L	L	0.82		24.5	6
17	0.93		17	0.93		-19		L	L	0.82			0
80	1.04		80	1.04		-29		L	L	0.82			-10
120	1.11		120	1.11		-39		L	L	0.82			-20
168	1.19		168	1.19		-49		L	L	0.82			-30
249	1.32		249	1.32		-59		L	L	0.82			-40
324	1.49		324	1.49		-69		L	L	0.82			-50

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Cell Power Detector

The following tables illustrate the measurements required for troubleshooting the cell power detector.

Table 9: Cell Power Setup

Mode	Tx	Rx	Band	Chnn	Rho
Local	On	On	CELL	384	On
	Input Chnn	Tx Freq	Rx Freq		
	384	836.52	881.52		

Table 10: Cell Power Measurements: Cell, Channel 384

Tx ADC	PA Gain Step		Conn RF Pout	Power Detector					Comments
RF/IF pdm	GIO 12	GIO 13		Pout at Detector	Test Point	Det Out	Test Point	mA	Det=Detector Po=Power
324	L	L	-50	-86.3	Right R814	2	Left C807	235	Cell band and detector coupling is about 22 dB
142	L	L	-25	-63		2		235	
17	L	L	0	-41		1.998		235	
-48	L	L	6	-30		1.967		250	
-48	H	L	7	-29		1.957		268	
-95	H	L	11	-26		1.93		286	
-95	H	H	13.2	-23.5		1.9		435	
-146	H	H	17	-21.5		1.86		486	
-178	H	H	19	-19		1.812		550	
-214	H	H	21	-17		1.745		630	
-252	H	H	23	-15		1.667		730	
-290	H	H	25	-12		1.547		860	
-316	H	H	26	-11.5		1.485		950	
-328	H	H	26.5	-11		1.44		1000	
-351	H	H	27.5	-10		1.36		1095	
none			dBm	dBm/ 30kHz		VDC			dBm only refers to total power measured

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Table 11: Detector Reference and DC Supply

label	Test Point	Typical Value
Det Ref	left-C803	2
Det Supply	bottom-C257	2.8
		VDC

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Tx System Block Diagram

See the *Schematics* chapter for a 2118 transmitter schematic.

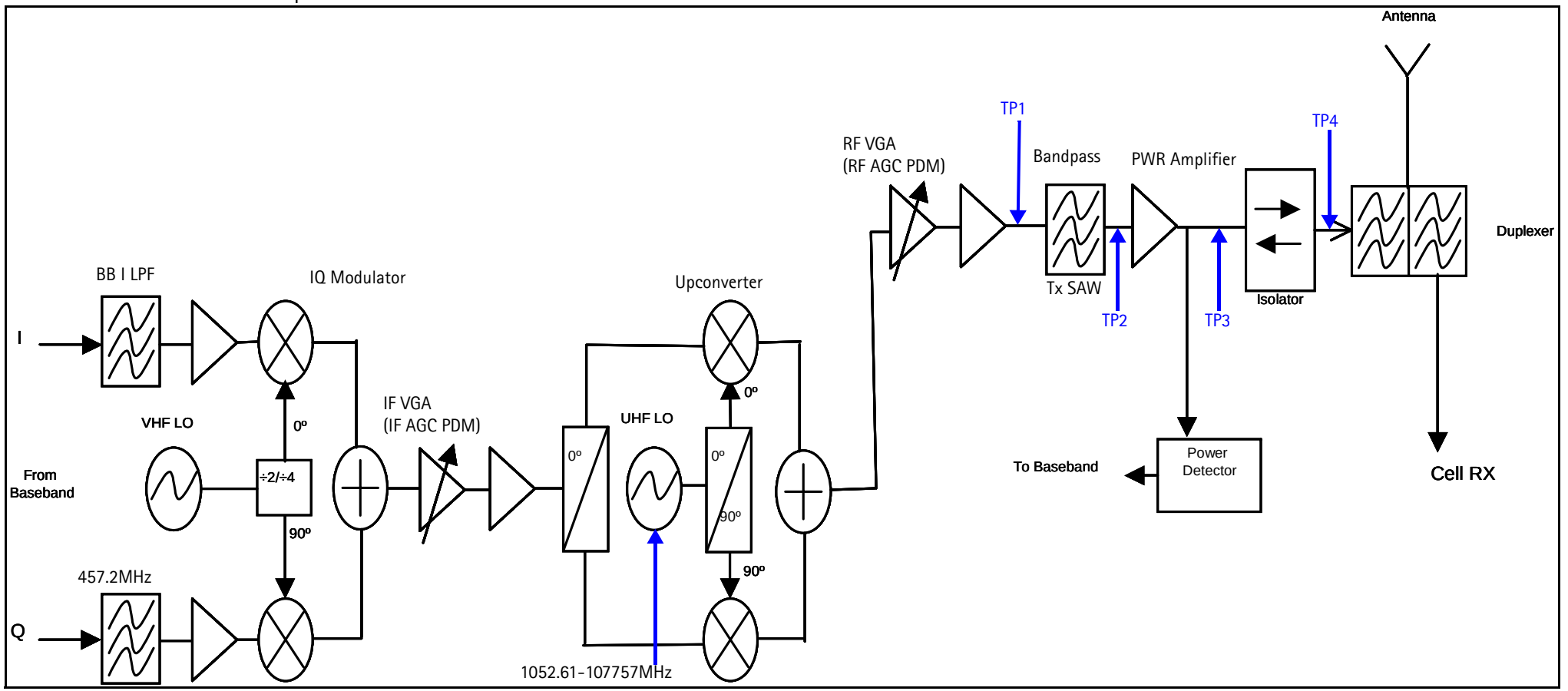

Figure 10: Tx system block diagram

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Receiver Troubleshooting

Rx IF

Use Phoenix to perform the following steps for troubleshooting the receiver. Together with the VCO frequency and level verification, this test should be the first test for a non-working receiver. This test verifies the entire receiver chain, from input connector to baseband output.

1. Inject a CW signal 881.82 MHz or 881.22 MHz (CH-384 offset by 300 KHz) at a fixed –75 dBm power level. If you do not have a signal generator, use the call box in AMPS mode on Channel 374 or 394 (10 channels away from channel 384).
2. Open the **Phone Control** dialog box.

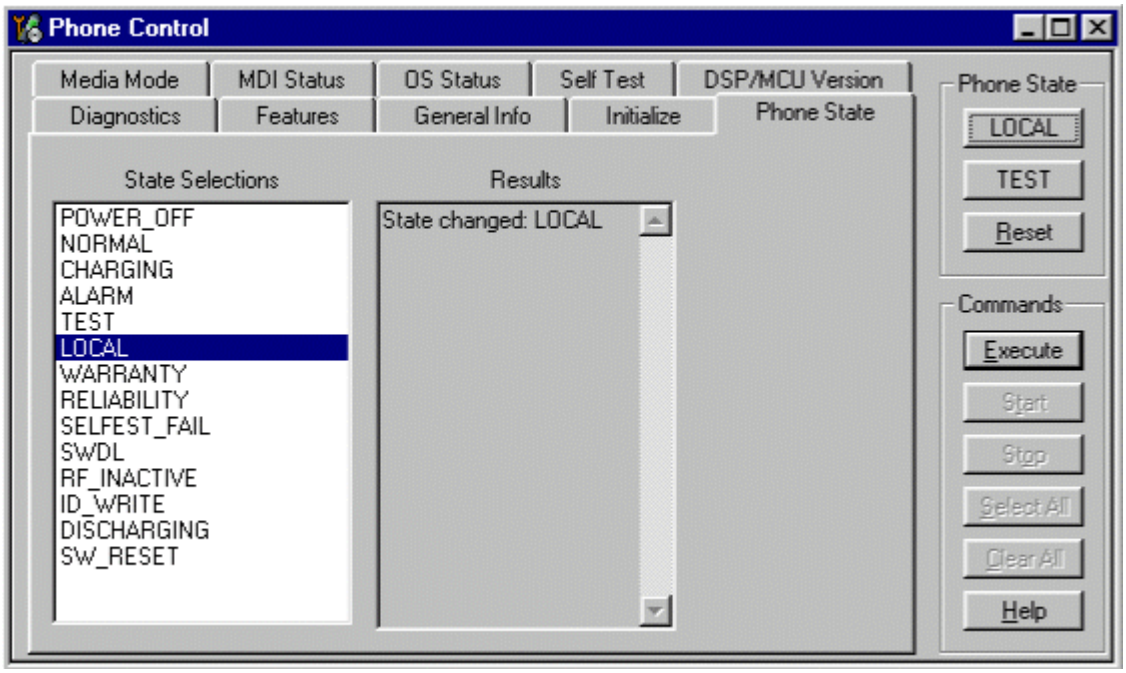

Figure 11: Phone Control dialog box for Rx IF troubleshooting

3. Click the **LOCAL** button in the **Phone State** area to put the mobile terminal into Local Mode.
4. Select the following values on the **RF Main Mode** dialog box:
   - **Band** = Cell (CDMA)
   - **Channel** = 384
   - **Mode** = Rx

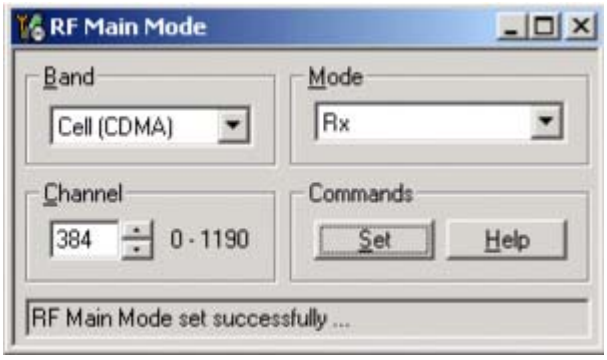

Figure 12: RF Main Mode dialog box for Rx IF troubleshooting

5. Click **Set**.

   Note: Be sure that the "RF Main Mode set successfully" message appears in the status bar.

6. Use a spectrum analyzer to test TP3 (I+,I-, Q+, Q-). Set the S.A to 300 KHz center frequency, 200 KHz SPAN, and +10 dBm reference level. The spectrum analyzer should read –8 dBm without any settings to the PDM.
7. Use Table 12 to configure the CDMA generator code domain.

Table 12: CDMA Generator Code Domain Setup

Channel	Power	Walsh Code
Pilot	-7dB	0
Paging	-12dB	1
Traffic	-15.6dB	10
Sync	-16dB	32

Table 13 shows the steps for Rx IF troubleshooting. See Figure 13 on page 22 for an illustration of the corresponding test points.

Table 13: Rx IF Troubleshooting

Step #	Part	Function	Typical Value/ Frequency HP85024A	Typical Value Frequency Prod Probe	Comments
TP1	L702R	IF-IN	+1.3 dBm/ 183.6MHz	-12/-27 dBm 183.6 MHz	I.F Input to Z701 (I.F filter). *NOT 50 ohm*
TP2	L701L/R	SAW Out	-16 dBm/ 183.6MHz	-35/-50 dBm 183.6 MHz	Differential outputs of Z701. *NOT 50 ohm*

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Table 13: Rx IF Troubleshooting (Continued)

Step #	Part	Function	Typical Value/ Frequency HP85024A	Typical Value Frequency Prod Probe	Comments
TP3	I+, I-, Q+, Q-	I/Q outputs of N700	300KHz tone for input: 881.22 MHz	-69/-84 dBm 300 KHz	Baseband differential outputs of the IF IC (N700). To test: set the input to 881.22 or 881.82 MHz/-75 dBm to get a 300 KHz tone when receiver is on channel 384 (881.52 MHz)
TP4	C728T	19.2MHz In	+6.5 dBm 19.2 MHz	-22 dBm 19.2 MHz	Sine wave input to N700 from VCTCXO.
TP5	C711T	19.2MHz Out	+4 dBm 19.2 MHz	-25 dBm 19.2 MHz	Square wave output of N700 to baseband.
TP6	L708R (L708R for Prod Probe)	VHF VCO	+1.0 dBm 367.2 MHz	-61 dBm 367.2 MHz	Rx VHF VCO - Fixed at 367.2 MHz (Be careful not to load the circuit with the probe.)
TP7	C731T	VREF	1.35 Vdc		System reference voltage 1.35 Vdc from UEM.
TP8	R702L (C703R)	RX_IF_AGC	0.2 to 1.8 Vdc		AGC control Voltage. 0.2V = Max Gain, 1.8 V = Minimum Gain
TP9	R703T (R701L, R715T)	VR7	2.7 Vdc		VHF VCO Supply from UEM
TP10	C734B	VR3	2.7 Vdc		VCTCXO buffer supply from UEM.
TP11	C712R, C744R	VR6	2.7 Vdc		Main supply to N700, from UEM.
TP12	C710T, C704B	VIO	1.8 Vdc		Digital circuits supply from UEM.

** The R, L, T, and B values at the end of the part numbers indicate the Right, Left, Top, and Bottom side of the part respectively in Figure 13.*

Figure 13 shows each test point as listed in Table 13.

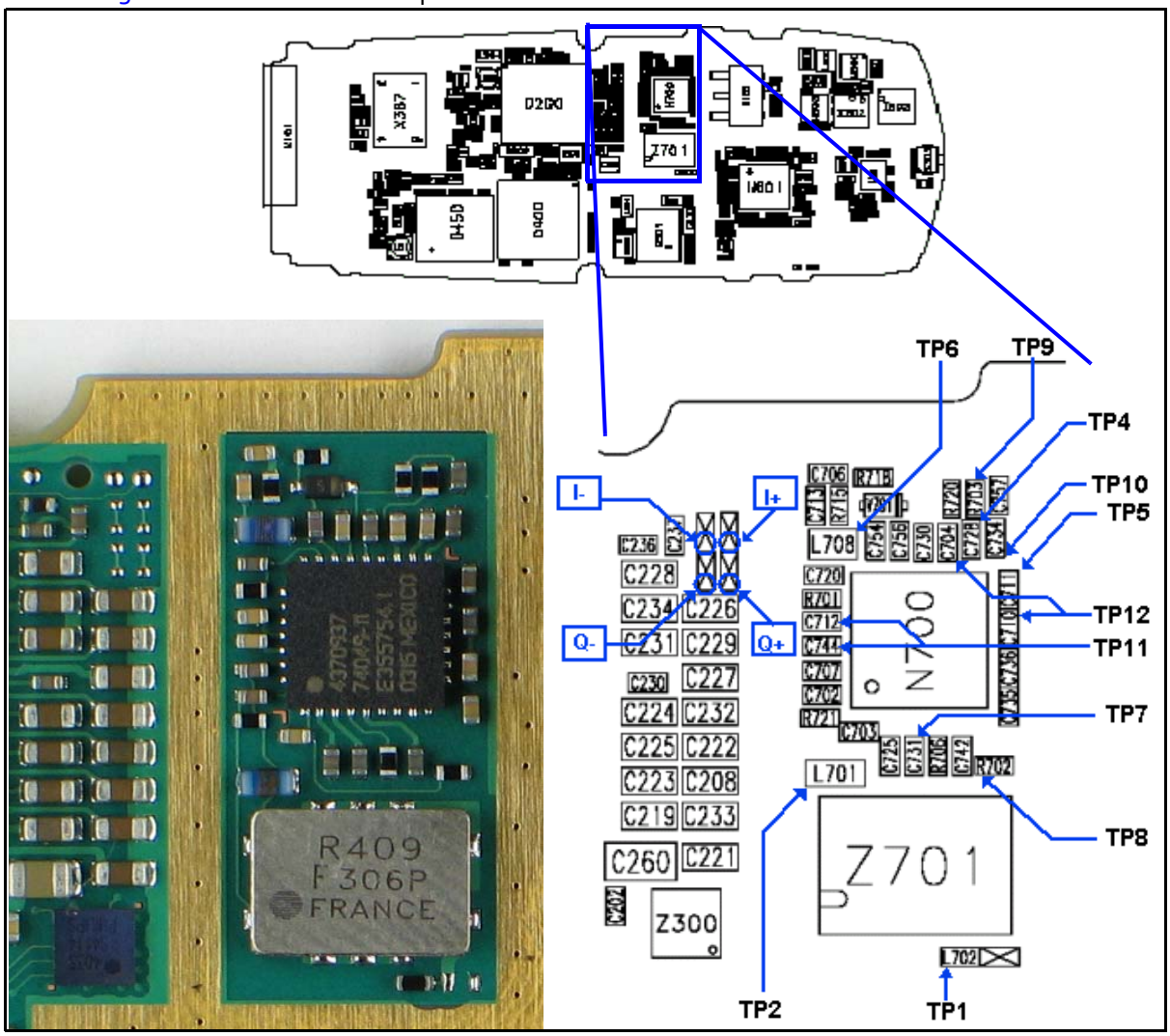

Figure 13: (Top) PWB. (Bottom left) A zoomed view of the testing points on the Rx IF section. (Bottom right) A zoomed view of the Rx IF section with part numbers.

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Figure 14 shows an alternate part orientation. Notice that **Pin 1 is rotated 180 degrees** compared to the first filter as shown in Figure 13 on page 22. All test points and values are the same.

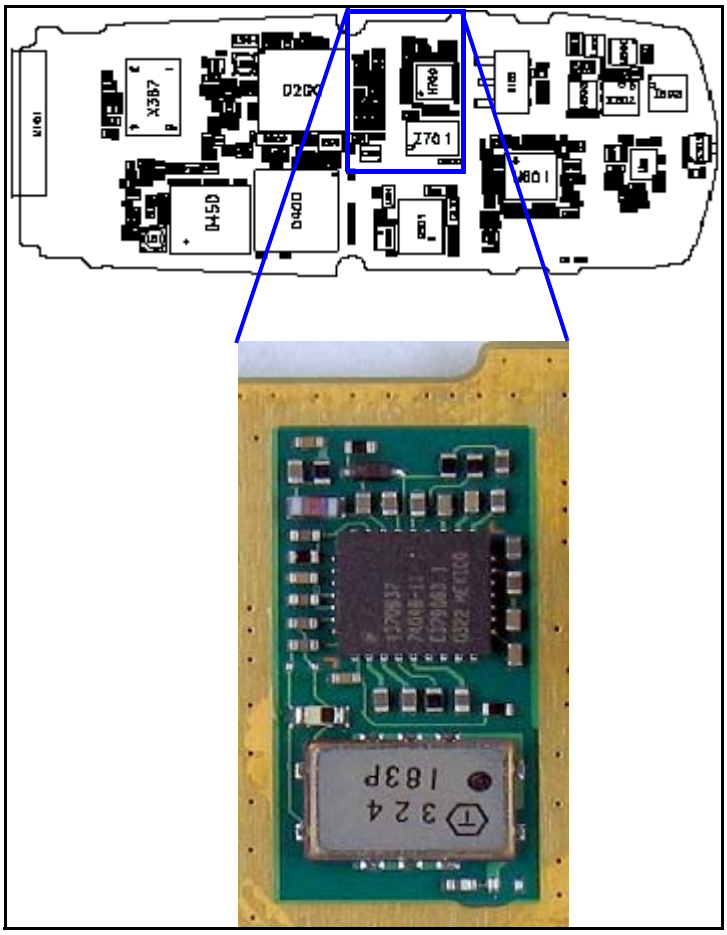

Figure 14: Alternate part orientation with pin 1 rotated 180 degrees

Switching the Gain

Use the following steps if the receiver is not working properly and you need to switch the Rx gain state.

1. Open the **Phone Control** dialog box.

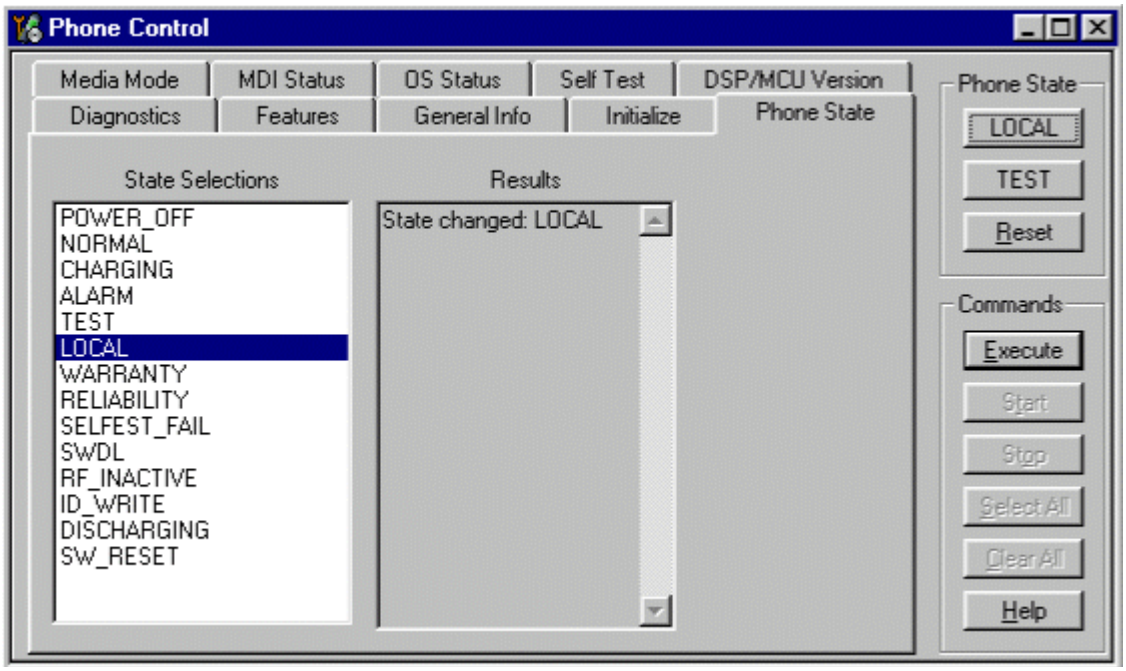

Figure 15: Phone Control dialog box for switching the Rx gain state

2. Click the **LOCAL** button in the **Phone State** area to put the mobile terminal into Local Mode.
3. Select the following values on the **RF Main Mode** dialog box:
   - **Band** = Cell (CDMA)
   - **Channel** = 384
   - **Mode** = Rx

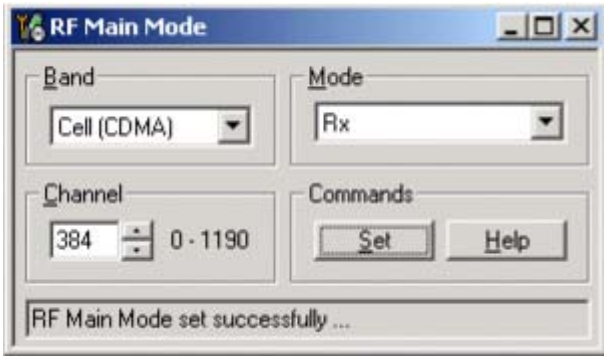

Figure 16: RF Main Mode dialog box for switching the Rx gain state

4. Click **Set**.

   Note: Be sure that the "RF Main Mode set successfully" message appears in the status bar.

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5. Connect a signal generator in CW mode (881.52 MHz, -25 dBm) to the RF connector. If you do not have a generator, use the Call Box Amps Mode RF Generator, Channel 384, -25 dBm and set the FM modulation to 100 Hz, deviation 400 Hz.
6. To switch the Rx gain states, open the RF Register R/W dialog box. Two gain states (Hi and Lo) are available in the receiver.

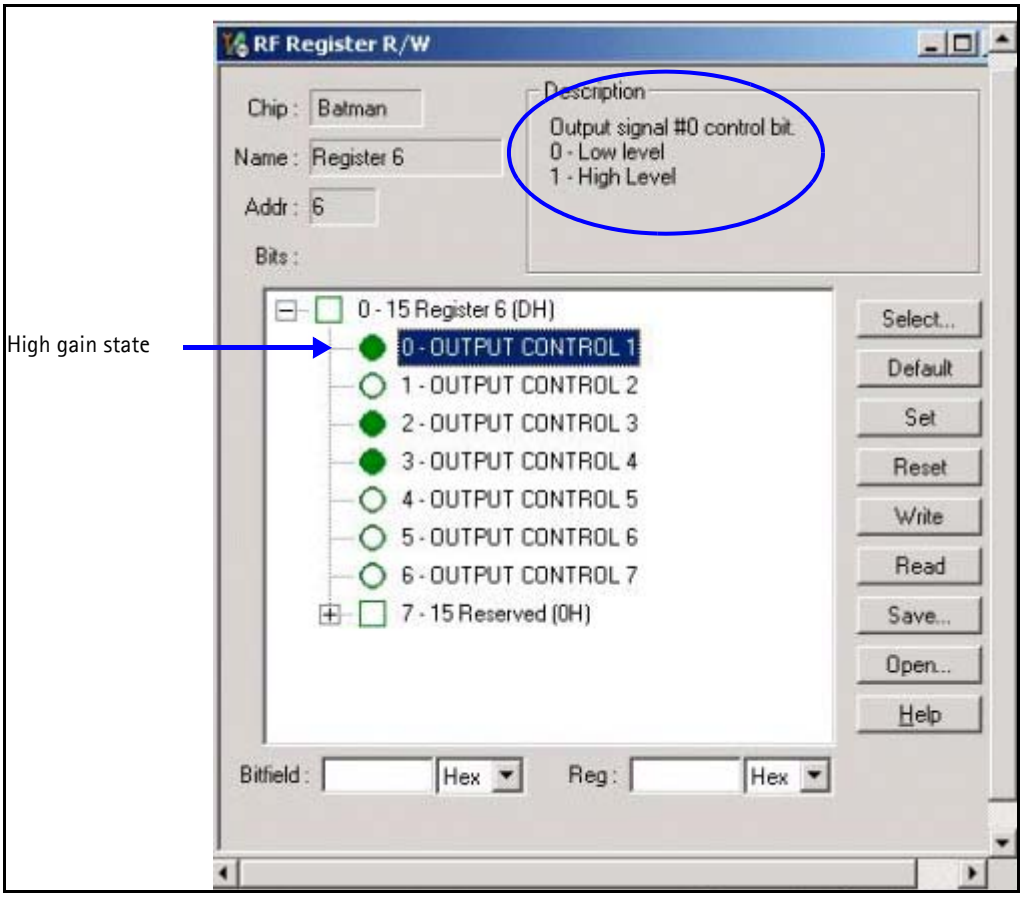

Figure 17: RF Register R/W dialog box for switching Rx gain states

7. Select the appropriate gain states from Register #6. The following values apply:
   - Bit 0=1, means a Hi gain state.
   - Bit 0=0, means a Lo gain state.

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Rx RF

The following Rx RF Troubleshooting table indicates the test points to probe when troubleshooting the Rx RF. It is recommended that you follow the steps in order. See Figure 18 on page 27 for an illustration of the test points.

Table 14: Rx RF Troubleshooting

Step #	Part	Function	Typical Value/ Frequency HP85024A	Typical Value Frequency Prod Probe	Comments
R1	L802R (Top side of the PWB)	RF-IN	-25 dBm/ 881.52 MHz	-42 dBm 881.52 MHz	Input Connector reference level
R2	L906L	LNA-In	-35dBm/ 881.52MHz	-42dBm 881.52MHz	Test Duplexer insertion Loss (Without DC Block)
R3	C903L	LNA-Out	-13/-31dBm 881.52MHz	-29/-45dBm 881.52MHz	Test LNA gain ~ 13dB
R4	Z901-R-Bottom, N901-Pin16	RF Filter Output Mixer-In	-18/-35dBm 881.52MHz	-30/-45dBm 881.52MHz	Test RF Filter Insertion loss (Without DC Block)
R5	C906R	Mixer-out	-5/-21dBm 183.6 MHz	-23/-38dBm 183.6MHz	Test Output on Downconverter on N901
R6	C912B/R914R	IF Output to N700	+1.5/-15dBm 183.6MHz	-12/-29dBm 183.6MHz	Test N2302 output to N700 IF-IC
R7	R912B/R911L	L.O Input to N901	-2.5dBm 1065.12MHz	-18dBm 1065.12MHz	Test VCO output to N2302 Levels are for Channel 384
R8	R9056T, L909L, L901T, R910B	VR4	2.7V dc		Power supply to N2302
R9	R902B	Rx-SW1	H.G = 2.7V L.G = 0V		LNA gain control, on the N2302 side, High Gain > 2.5V dc

** The R, L, T, and B values at the end of the part names indicate the Right, Left, Top, and Bottom side of the part respectively in Figure 18.*

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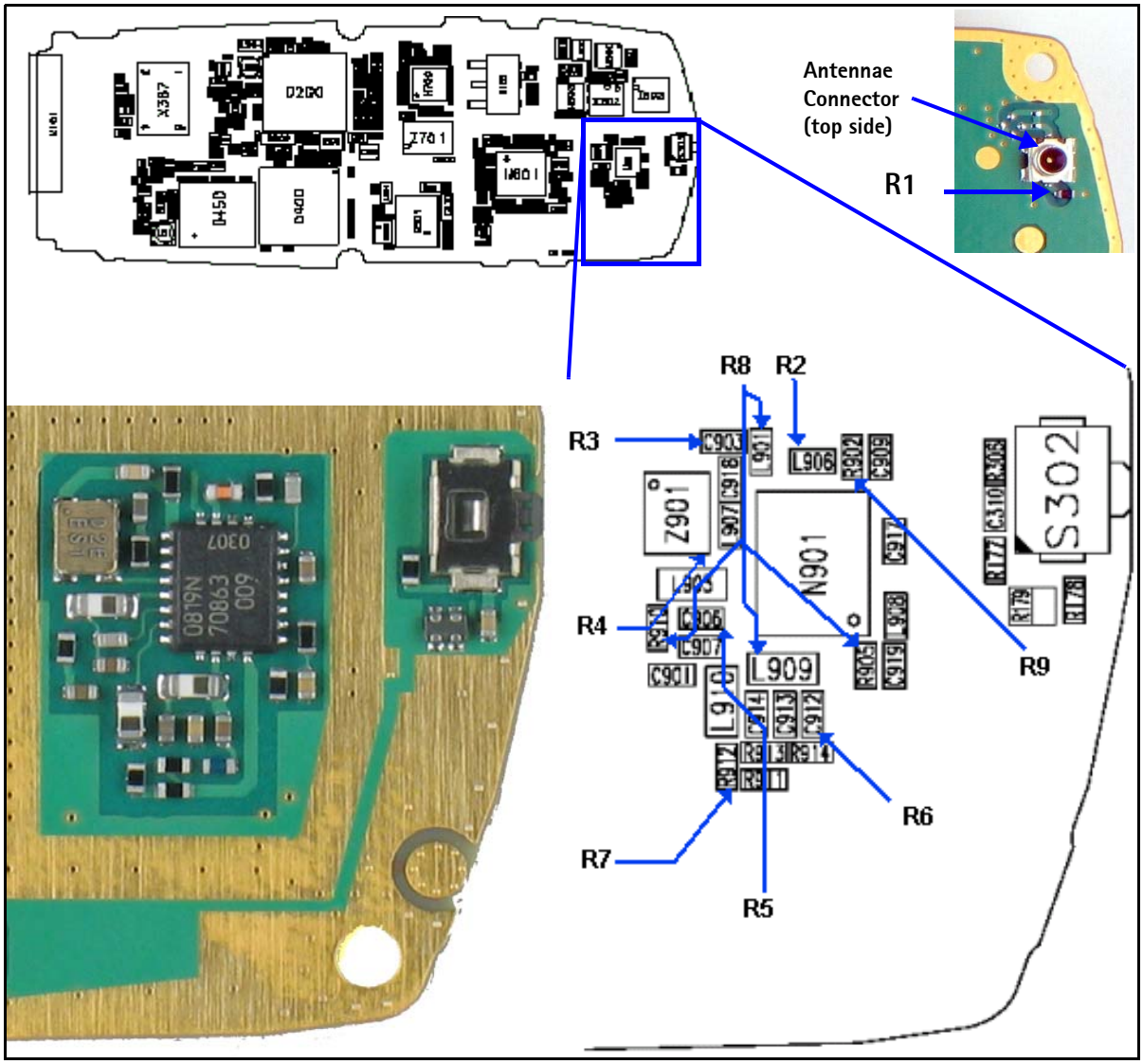

Figure 18: (Top left) PWB. (Top right) The antenna connector on the opposite side of the PWB, (Bottom left) A zoomed view of the testing points on the Rx RF section. (Bottom right) A zoomed view of the Rx RF section with part numbers.

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Rx AGC (Cell mode)

The following Rx RF AGC PDM vs. AGC Voltage table shows the Rx RF AGC PDM vs. AGC voltages in local mode on channel 384.

Table 15: Rx RF AGC PDM vs. AGC Voltage

PDM	Typical Value	Test Point
-512	0.08	right R702
-400	0.260	
-300	0.436	
-200	0.597	
-100	0.753	
0	0.913	
100	1.076	
200	1.24	
300	1.403	
350	1.494	
400	1.570	
500	1.740	
511	1.761	
UNITS	VDC	

Table 16: Rx AGC vs. RF Pin for CELL Band

Conn RF Pin	CELL RF AGC	Comments
-25	1.492	
-35	1.298	
-45	1.159	In Normal mode, the mobile terminal will adjust RF RX AGC
-55	1.019	Rx power is coming in, the I and Q will be about 0.5Vpp and 1.3V
-65	0.861	
-75	0.705	Approximately 1pdm per 1mV
-85	0.530	
-92	0.425	
-95	0.633	Note the reduced delta because the LNA is switched on
-100	0.594	
-105	0.524	

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Table 16: Rx AGC vs. RF Pin for CELL Band (Continued)

Conn RF Pin	CELL RF AGC	Comments
-107	0.470	
UNITS	**VDC**	

Receiver Block Diagram

See the *Schematics* chapter for a 2118 receiver schematic.

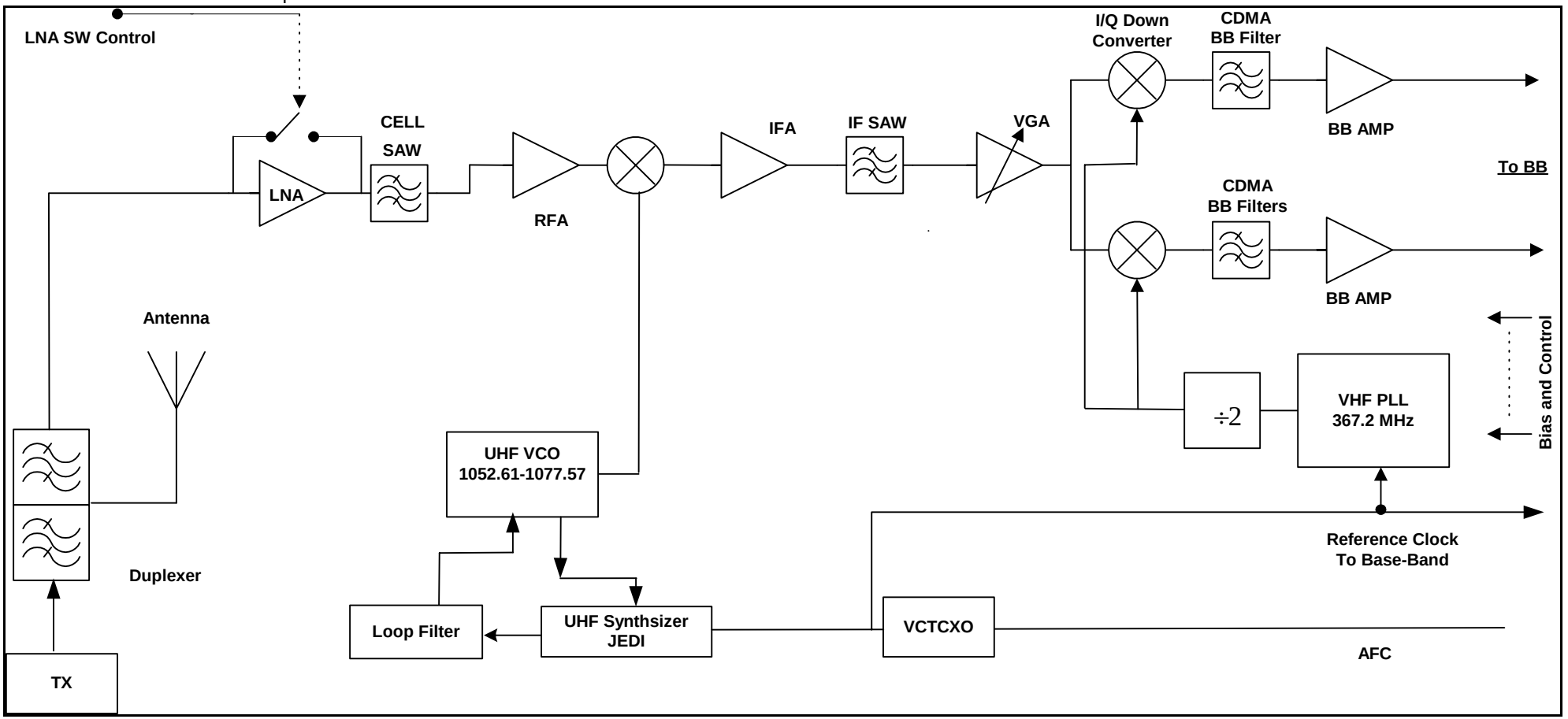

Figure 19: Receiver block diagram

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Synthesizer Troubleshooting

Faulty synthesizers can cause both Rx and Tx failures during tuning, in addition to the VCTCXO tuning. The following synthesizers are incorporated into the mobile terminal:

- UHF (cell) PLL inside N601 IC
- Tx VHF (457.2MHz) with PLL in N601 IC in Cell Mode
- Tx VHF (527.2MHz) with PLL in N601 IC in PCS Mode
- Rx VHF (367.2MHz) with PLL in N700 IC

Synthesizer Setup

Use the following steps to set up the mobile terminal for Tx troubleshooting in Phoenix.

1. Open the **Phone Control** dialog box.

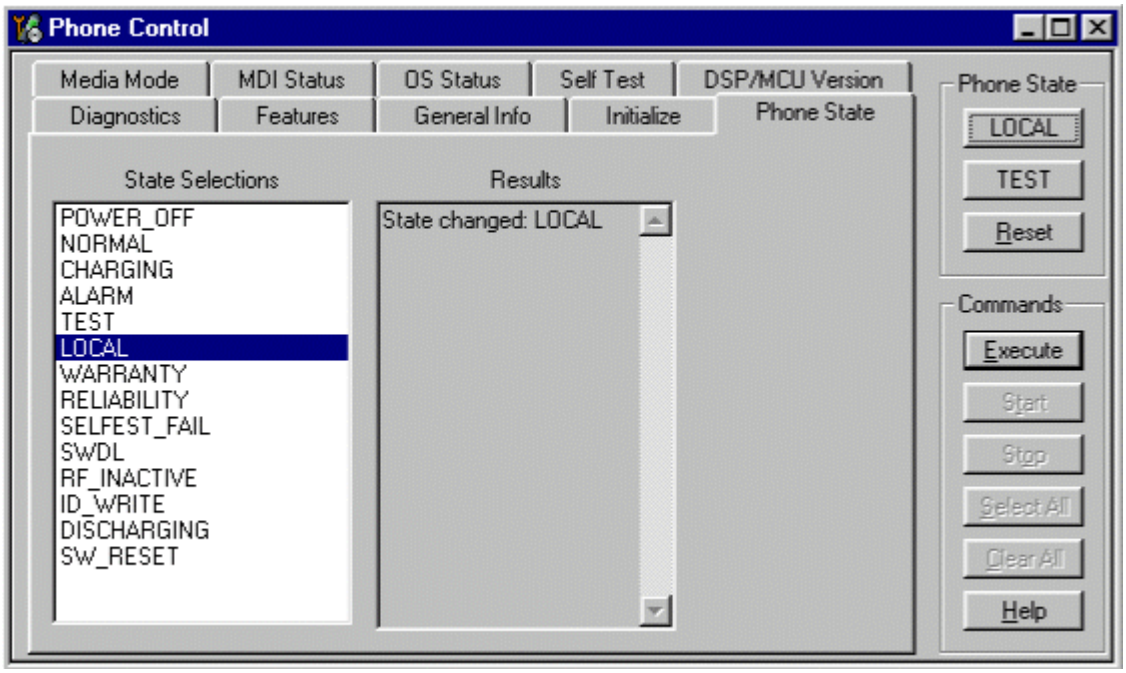

Figure 20: Phone Control dialog box for Tx troubleshooting

2. Click the **LOCAL** button in the **Phone State** area to put the mobile terminal into Local Mode.
3. Use the following settings for the **Band**, **Channel**, and **Mode** fields on the **RF Main Mode** dialog box:
   - UHF: Use the Rx/Tx mode and channel 384 in Cell band. This allows you to check power in both the Rx and Tx circuits.
   - Rx VHF: Use the Rx mode. One band is enough.
   - Tx VHF: Use the Rx/Tx mode in Cell band.

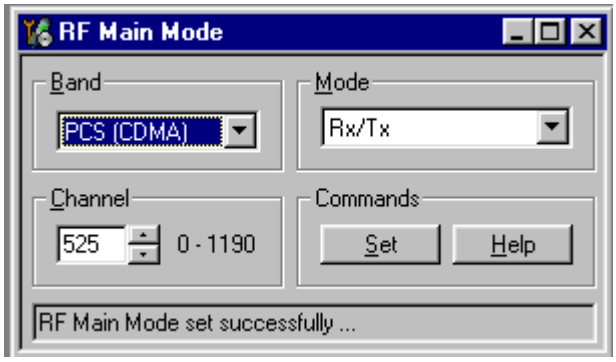

Figure 21: RF Main Mode dialog box for synthesizer troubleshooting

4. Click **Set**.

   Note: Be sure that the "RF Main Mode set successfully" message appears in the status bar.

5. Read register templates N601(0) bits 10 and 11 for the UHF and Tx VHF lock condition on the **RF Register R/W** dialog box.

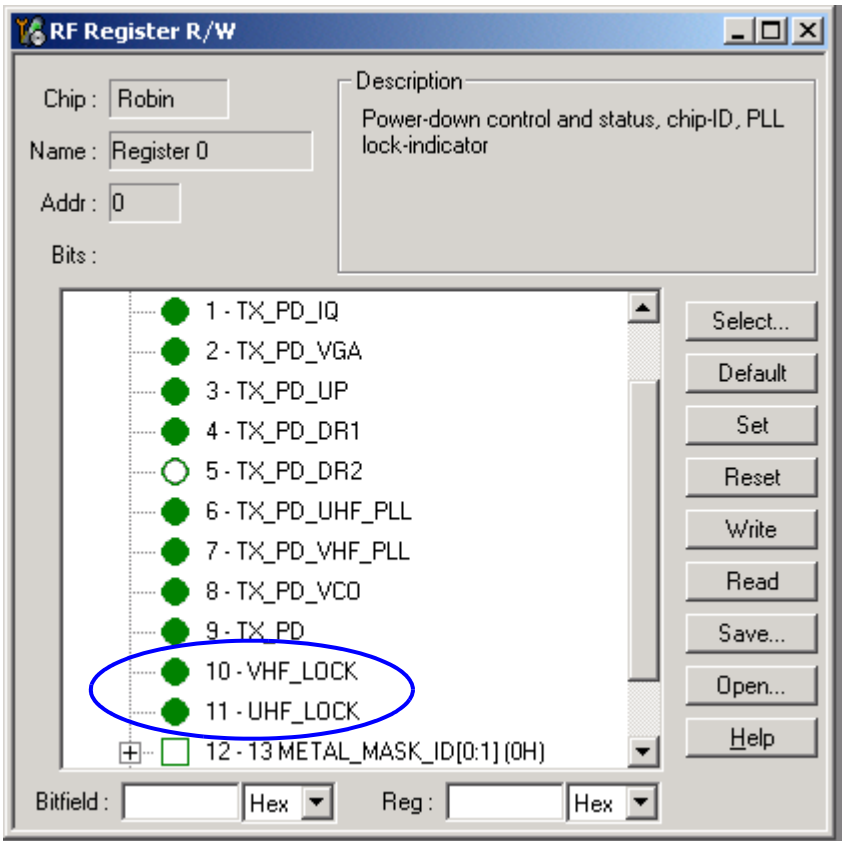

Figure 22: RF Register R/W dialog box for synthesizer setup

6. Read register templates N700(0) bit 11 for the RX VHF lock condition.

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VCTCXO Tuning

The VCTCXO can be manually tuned to verify failed tuned mobile terminals, or to verify if a mobile terminal cannot make a call. This can be done with the mobile terminal in Local Mode and generating a CW signal. The frequency accuracy of the VCTCXO can be measured using an HP8960 callbox in AMPS mode, an HP4406 Tx tester, or a spectrum analyzer (preferably using a lab system 10MHz source as equipment reference). Replace the VCTCXO if the VCTCXO AFC DAC value does not meet the tuning requirements after tuning.

Use the following steps to manually tune the VCTCXO:

1. Open the **Phone Control** dialog box.

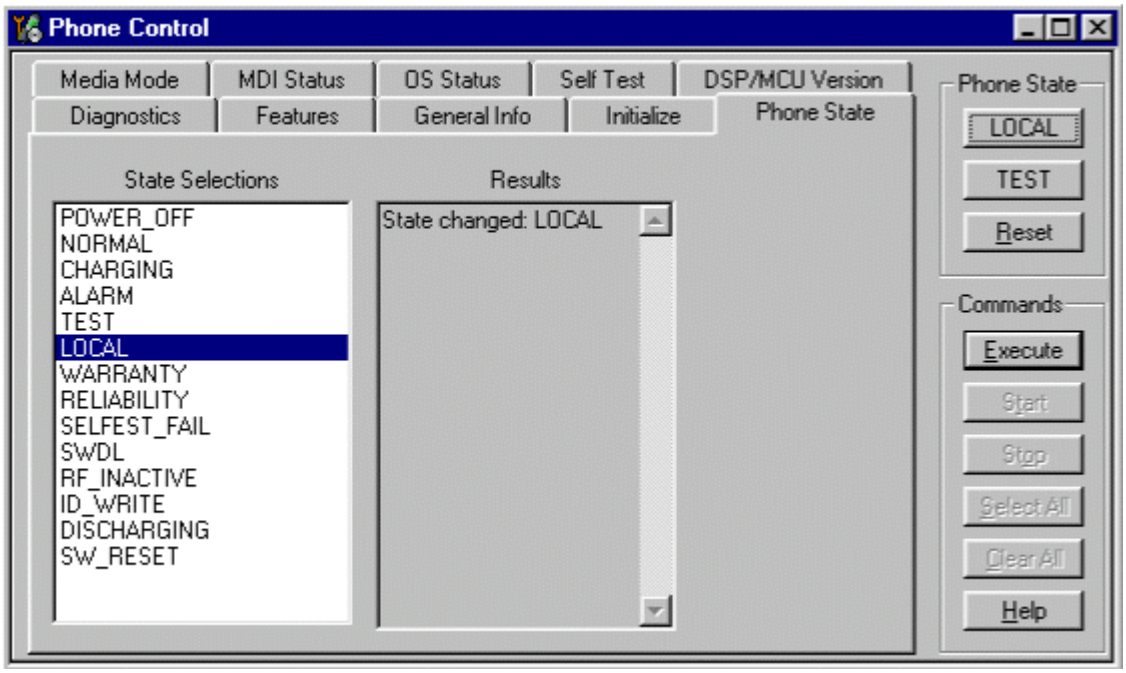

Figure 23: Phone Control dialog box for VCTCXO troubleshooting

2. Click the **LOCAL** button in the **Phone State** area to put the mobile terminal into Local Mode.
3. Select the following values on the **RF Main Mode** dialog box:
   - **Band** = Cell (CDMA)
   - **Channel** = 384
   - **Mode** = Rx/Tx

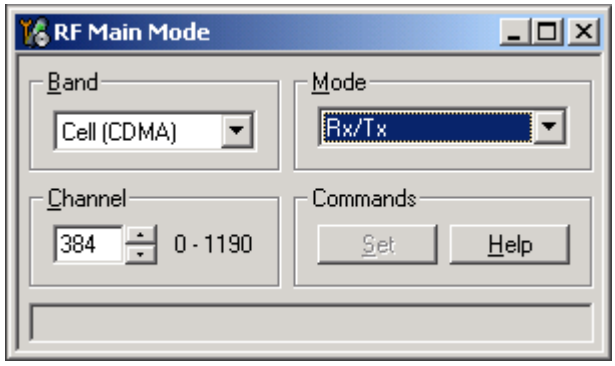

Figure 24: RF Main Mode dialog box for VCTCXO troubleshooting

4. *Do not* use CDMA control to turn on Rho.
5. Open the **BB General I/O** dialog box to set the CW signal.
6. Type 10, 13, 12, and 8 in the fields in the **PIN #** column.

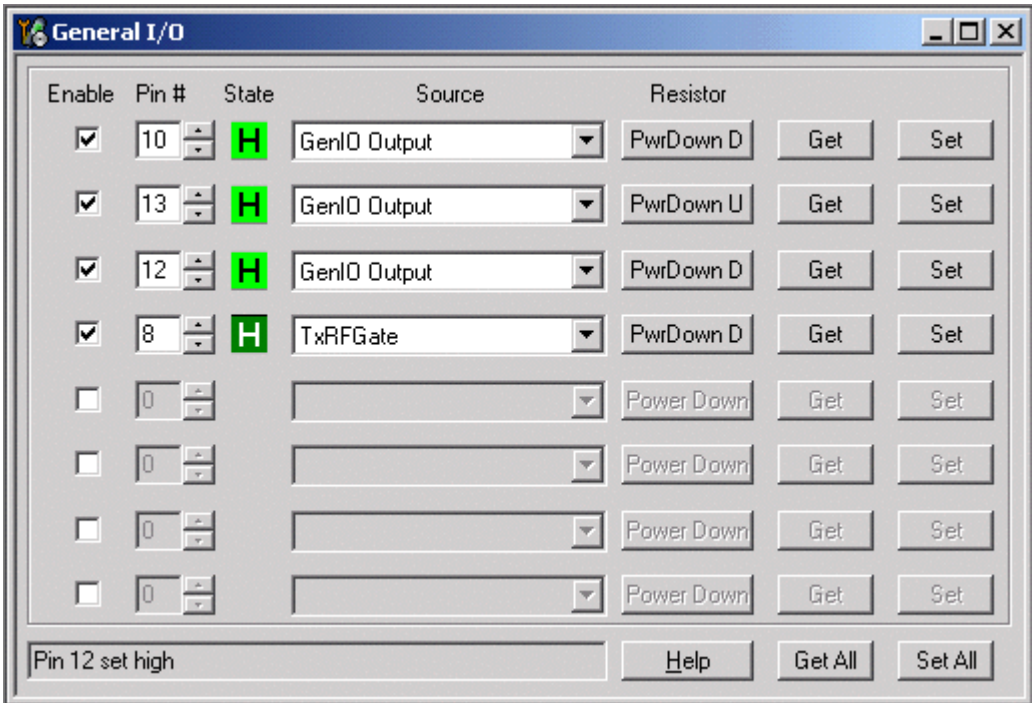

Figure 25: General I/O dialog box for VCTCXO tuning

7. Click the **Get All** button.
8. Change the value for Pin 8 in the **Source** column to GenIO Output.
9. Ensure that all of the pins have a value of H in the **State** column. (Click the L values to change them to H values.)

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10. The next step depends on the type of measurement equipment you are using:
    - HP4406 or a spectrum analyzer: Set the center frequency to 836.52MHz and the span to 2MHz. Also, establish a marker at 836.52MHz.
    - HP8960: Set the callbox state to AMPS, and set the channel to 384. Use the Frequency Accuracy measurement to center the VCTCXO.
11. Adjust the AFC value to center the VCTCXO on the **RF PDM** dialog box. The tuning range is approximately +/- 10kHz.

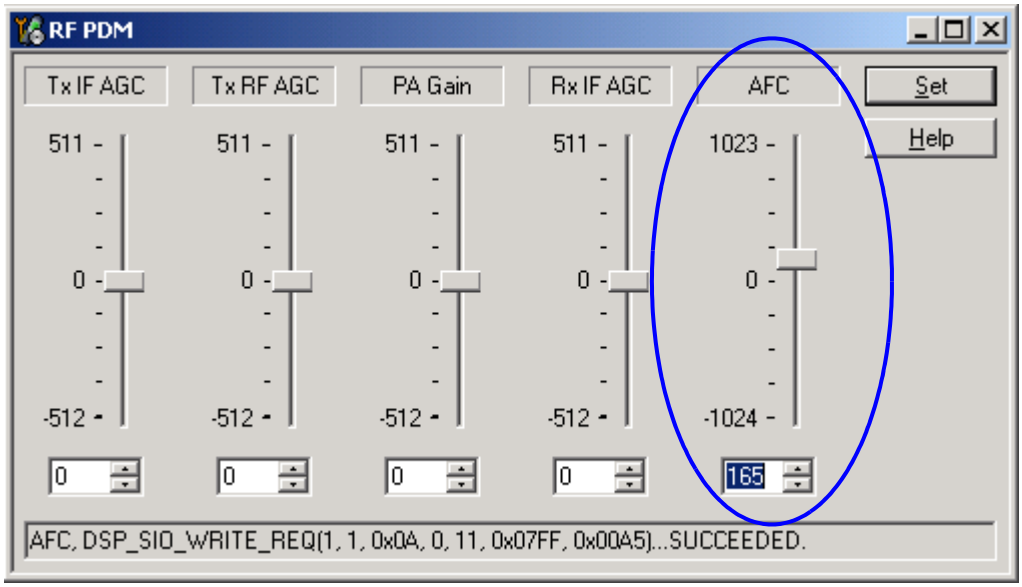

Figure 26: Manually adjusting the AFC to center VCTCXO

12. Adjust the AFC value so that the output signal is within +/- 100Hz. If you are using an HP4406 or a spectrum analyzer, narrow the span to 1kHz or less.

VCTCXO Reference Clock

Figure 27 shows the 19.2 MHz VCTCXO reference clock.

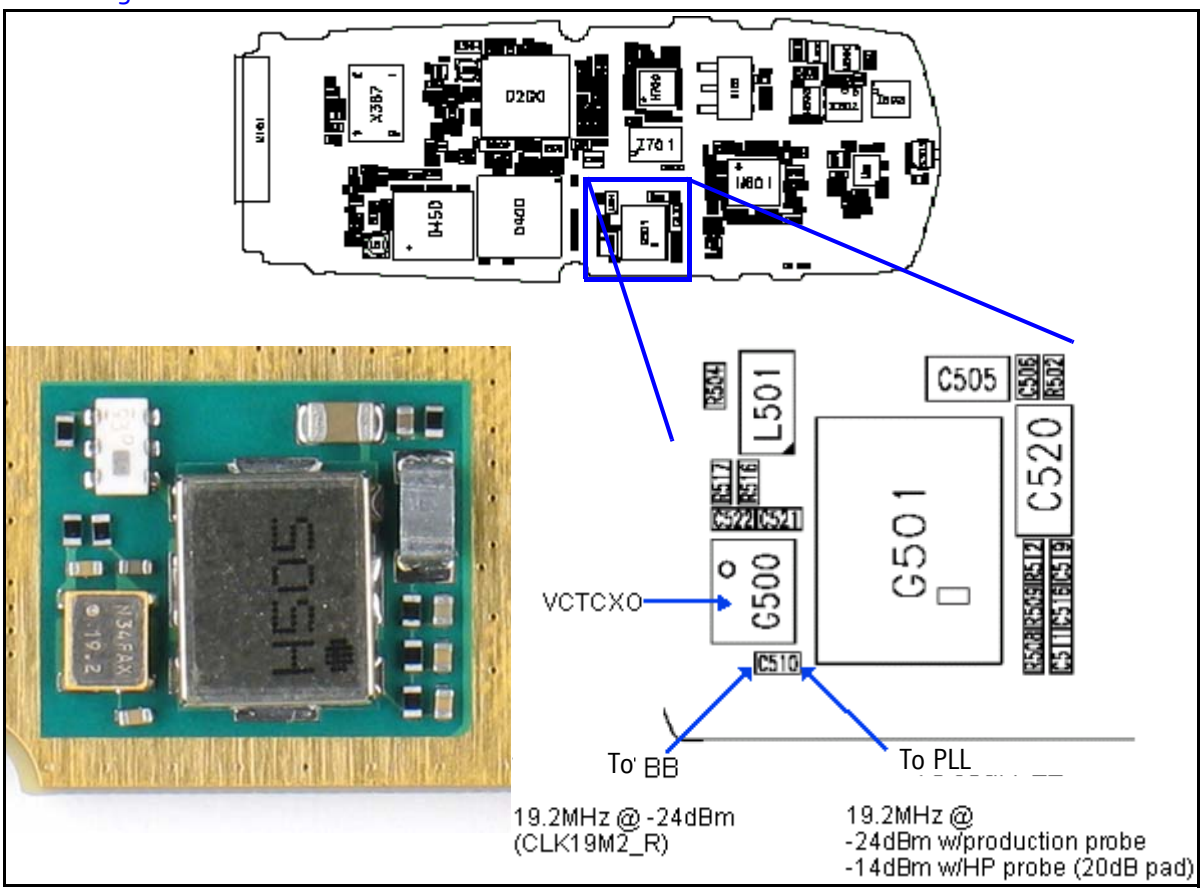

Figure 27: (Top) PWB. (Bottom left) A zoomed view of the testing points on the 19.2 MHz VCTCXO reference clock. (Bottom right) A zoomed view of the 19.2 MHz VCTCXO reference clock with part numbers.

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Synthesizer Block Diagram

See the *Schematics* chapter for the synthesizer schematic.

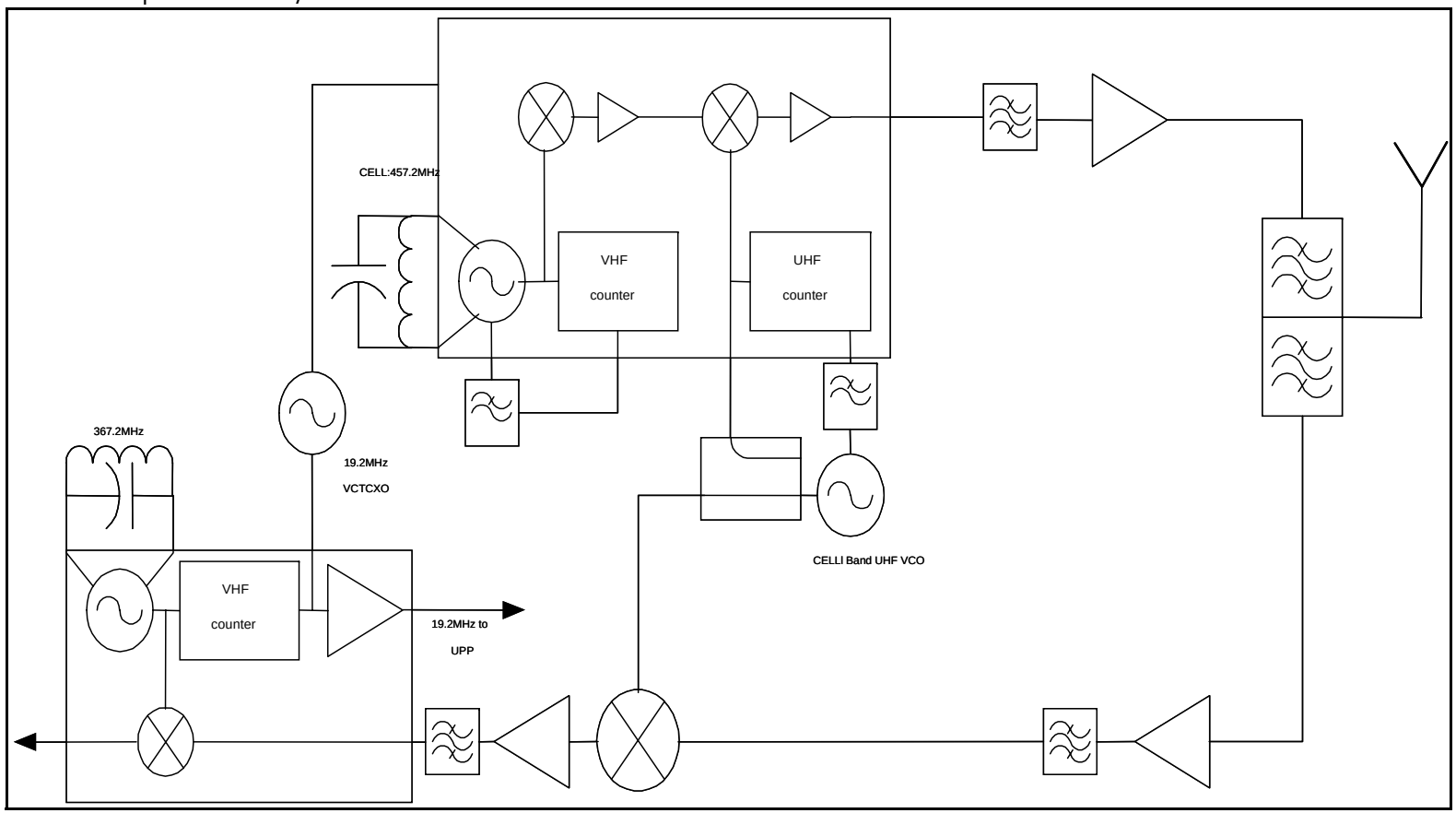

Figure 28: Synthesizer block diagram

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UHF Synthesizer

Following are possible causes for an incorrect UHF frequency:

- Orientation of N601
- Power supplies to N601 PLL are missing or low (VR7)
- Loop filter components are missing or incorrectly installed
- Matching components to N601 TxLO/PLL input are missing or incorrectly installed
- 19.2MHz reference clock is missing or low
- Programming is incorrect
- Component failure (VCO or PLL portion of N601)

Figure 29 and Figure 30 show the UHF synthesizer layout.

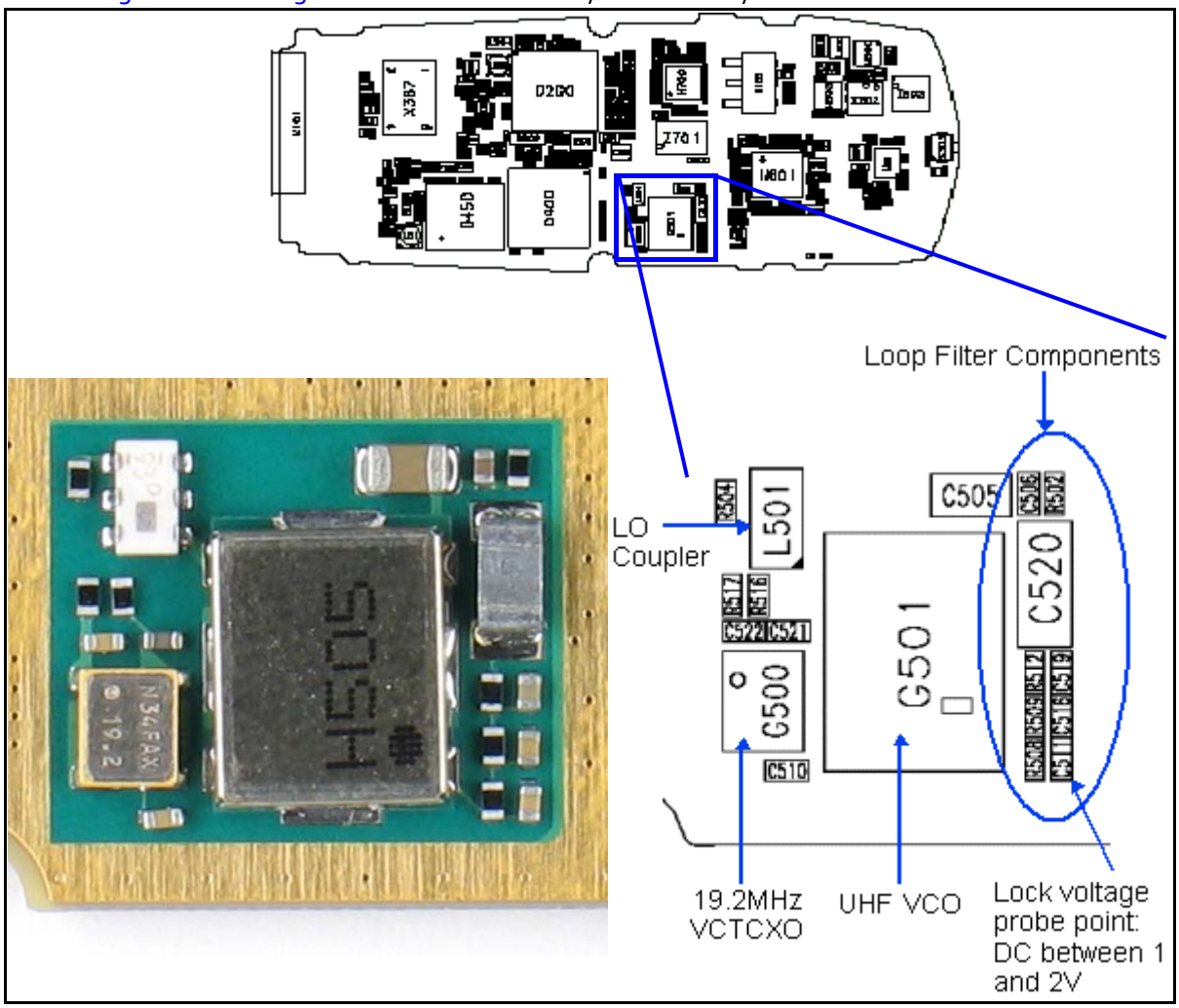

Figure 29: (Top) PWB. (Bottom left) A zoomed view of the testing points on the UHF synthesizer layout. (Bottom right) A zoomed view of the UHF synthesizer layout with part numbers.

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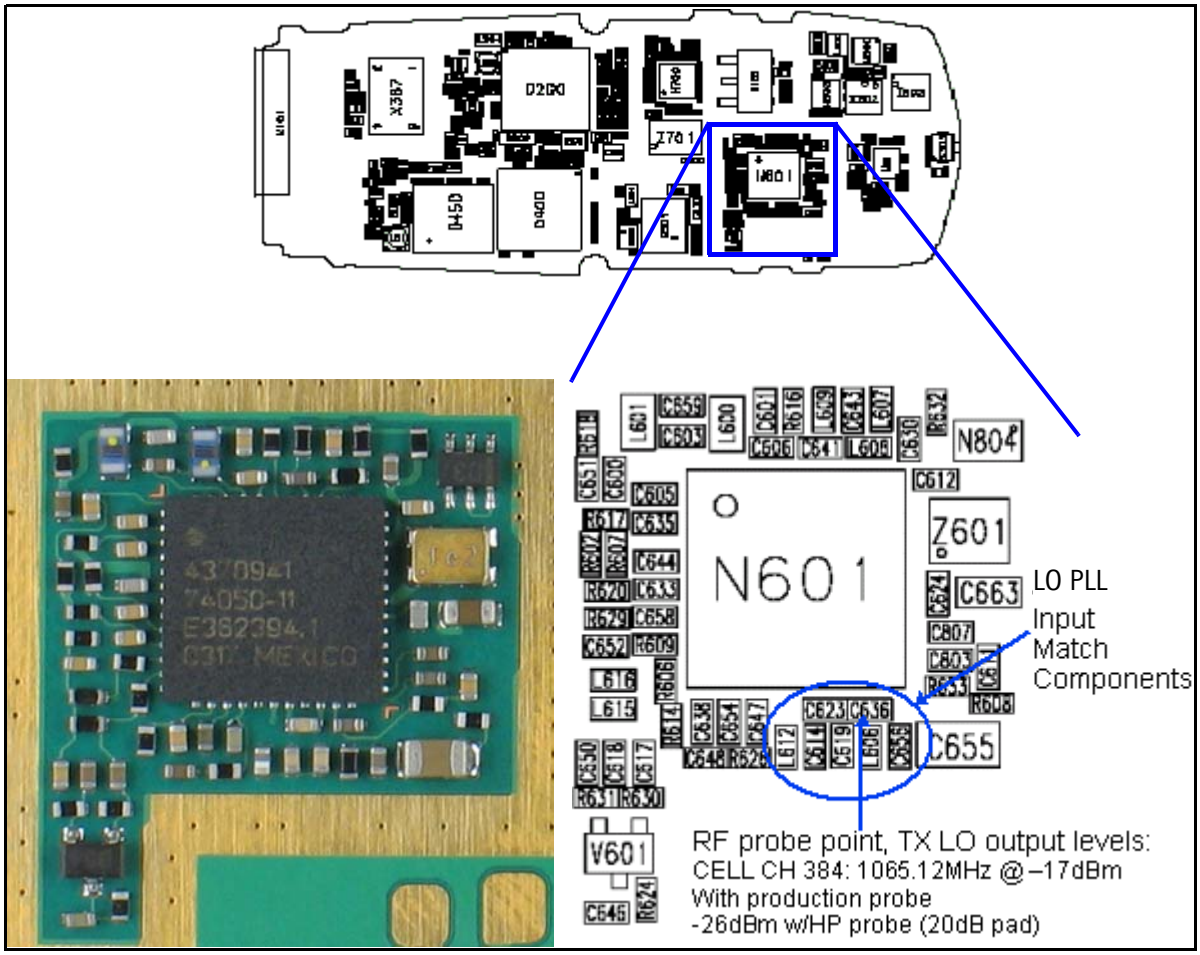

Figure 30: (Top) PWB. (Bottom left) A zoomed view of the N601 LO/PLL input match components on the UHF synthesizer layout (Bottom right) A zoomed view of the N601 LO/PLL input match components UHF synthesizer layout with part numbers.

Rx VHF

Following are possible causes for an incorrect Rx VHF frequency:

- Power supplies to the PLL portion of N700 IC are missing or low (VR7)
- Loop filter or resonator components are missing or incorrectly installed
- 19.2MHz reference clock is missing or low (C510)
- Programming is incorrect

Note: See the Schematics *chapter for the Rx VHF schematic.*

Figure 31 shows the layout for the Rx VHF.

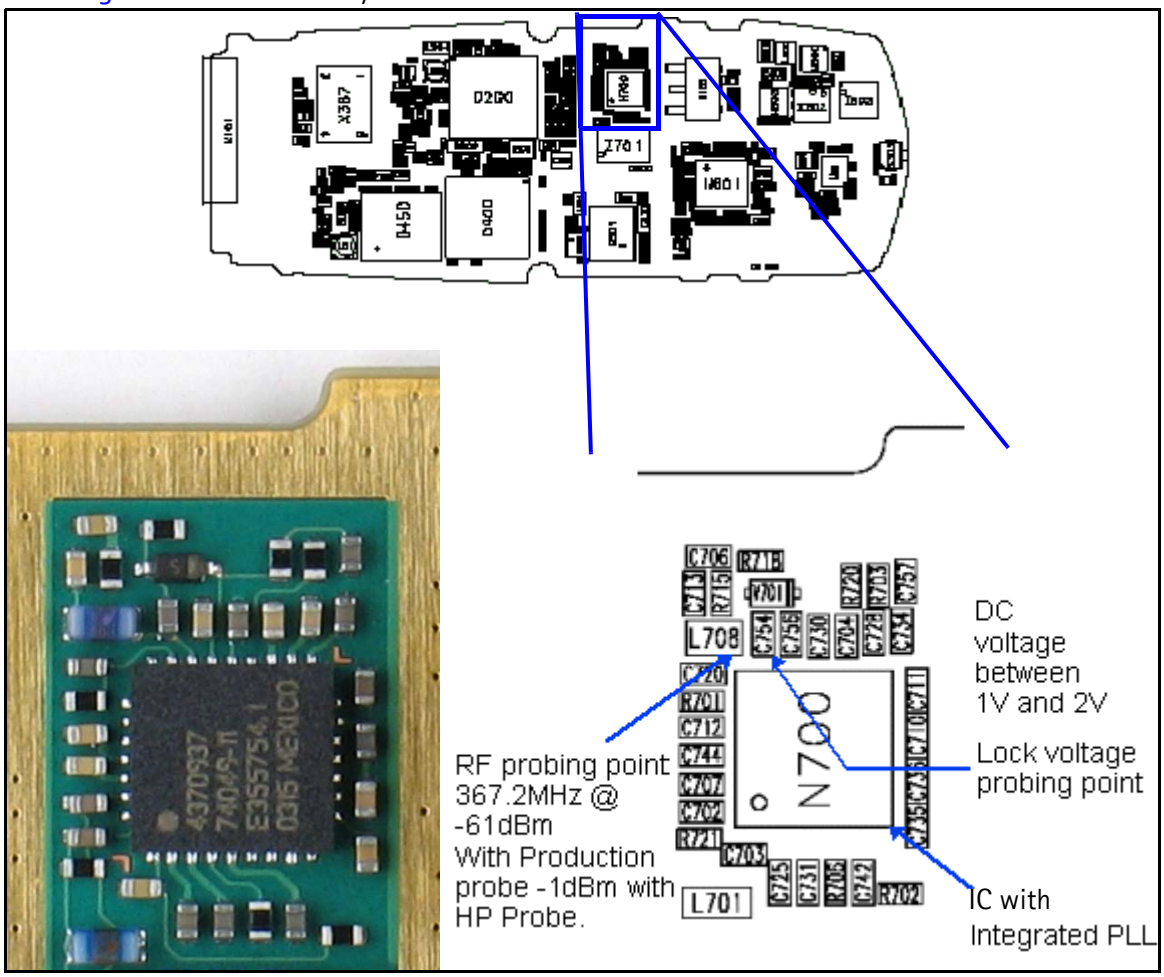

Figure 31: (Top) PWB. (Bottom left) A zoomed view of the testing points on the Rx VHF section. (Bottom right) A zoomed view of the Rx VHF section with part numbers.

Tx VHF

Following are possible causes for an incorrect Tx VHF frequency:

- Power supplies to the PLL portion of N601IC missing or low (VR5)
- Loop filter or resonator components are missing or incorrectly installed
- 19.2MHz reference clock is missing or low (C510)
- Programming is incorrect
- Component failure (N601 IC)

Note: See the Schematics *chapter for the Tx VHF schematic.*

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Figure 32 shows the layout for the Tx VHF.

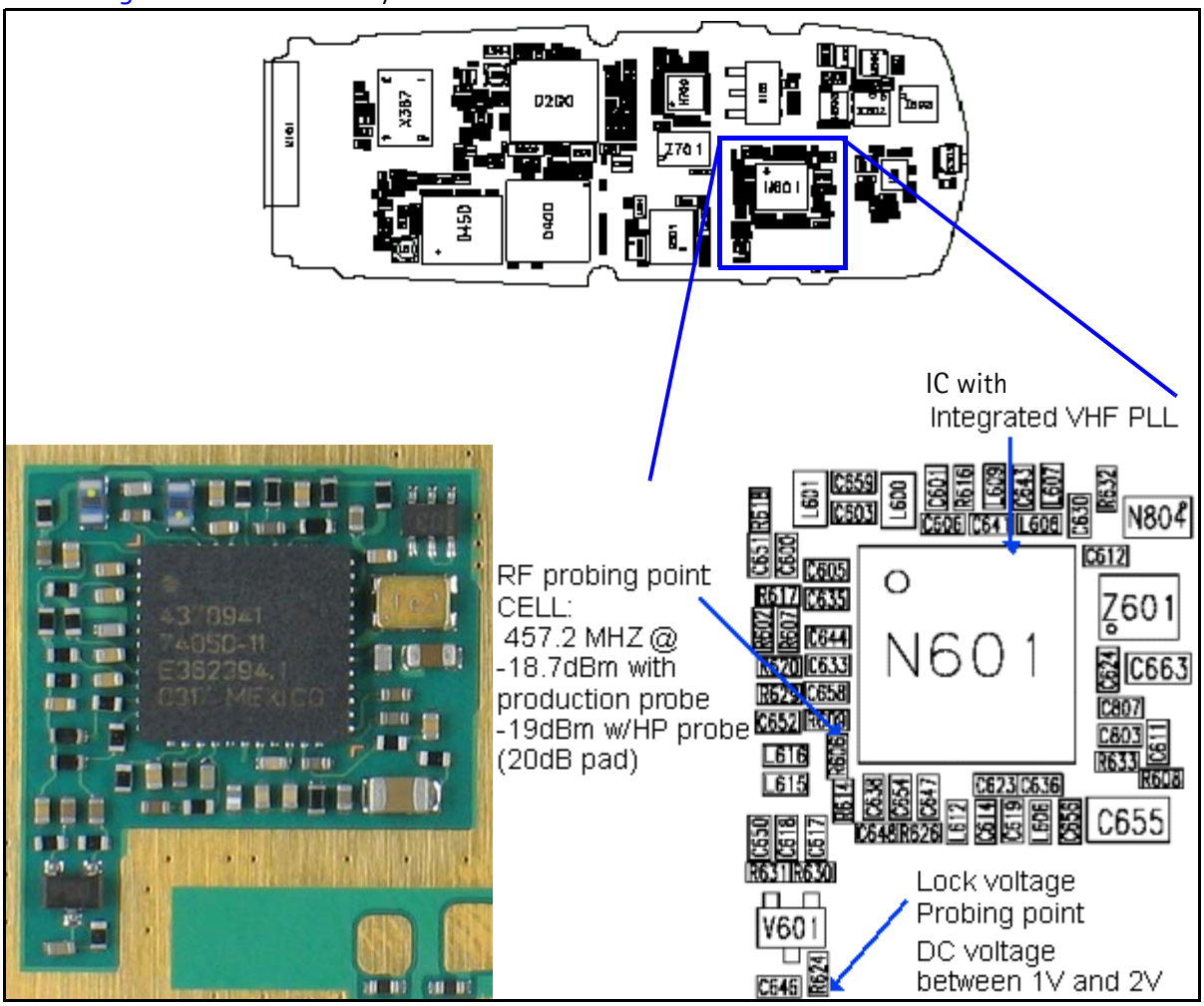

Figure 32: (Top) PWB. (Bottom left) A zoomed view of the testing points on the Tx VHF section. (Bottom right) A zoomed view of the Tx VHF section with part numbers.

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